Tobin Center

for the

Performing Arts

Thesis Proposal

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03.27.2014

Executive Summary

The Tobin Center for the Performing Arts is a 172,970sf venue that will feature major performing arts organizations of San Antonio. It is an inspiring expression for the arts, for its design integrates functionality, theatricality and community in both its historic elements and new addition.

This proposal details the work that will be completed, as part of the architectural engineering senior thesis in spring 2014. It presents a description of the redesign of lighting and electrical systems in the Tobin Center. Additionally, studies and explanations will be provided for two depth and two breadth topics. Works-in-progress and final documentations is to not state that there are actual existing system problems, but instead to provide an alternate approach.

The lighting depth will introduce new design concepts for four proposed spaces: Main Lobby, Patron's Lounge, Main Auditorium, and Event Plaza. The new design aims to create an engaging and welcoming environment that resonates with the community, complements the architecture, and celebrates the arts. Spaces should be functional, in which light levels meet specified recommendations in the IES handbook. Power density requirements, as presented in Standard 90.1, should also be met.

The electrical depth includes the redesign of the branch circuit systems of the four spaces and a short circuit analysis. Additionally, the depth will include the study of building-integrated photovoltaics and a comparison of a centralized transformer to the existing distributed transformers.

The mechanical/sustainability breadth shall include a study of biogas as a possible source of renewable energy for onsite electricity and heat generation. Rather than burning methane off in flares, greenhouse gases are turned into a power source. Research will focus on system implementation and interaction with the HVAC and power distribution systems.

The construction management breadth focuses on an in-depth cost and schedule analysis for a possible implementation of a Building-Integrated Photovoltaic (BIPV) system, which is presented in the Electrical Depth. Assembly estimates and supplier/vendor quotes will be provided. Comparative case studies will provide insight on how a BIPV system impacts construction time and cost.

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I. Building Overview

Location & Site:	100 Auditorium Circle, San Antonio, TX 78205
Building Occupant Name:	Tobin Center for the Performing Arts
Occupancy Type:	Assembly Group A-1 (primary)
Size:	172,970 GSF
Stories:	6 + 1 Basement

II. Project Team

Owner:	Bexar County Performing Arts Center Foundation
Owner's Rep:	The Projects Group Zachry Consturction Corporation Marmon Mok
Construction Manager:	Linbeck Zachry Construction Corporation
Architect of Record/Front of House (Prime):	LMN Architects
CA Lead/Back of House (Assoc./LEED Consulting):	Marmon Mok
Landscape Architect:	Mesa Design Group
Historic Preservation Consultant:	Fisher Heck Architects
Civil Engineer:	Pape-Dawson Engineers, Inc.
Structural Engineer:	Walter P. Moore (Prime/Front of House) Alpha Consulting Engineers (Assoc./Back of House)

1.0 Lighting Depth

The lighting depth will focus on the lighting design of four chosen spaces: Main Lobby, Patron's Lounge, Main Auditorium, and an Event Plaza.

Schematic lighting design concepts developed during the fall semester will be developed and finalized in order to meet qualitative and quantitative criteria, which was indicated in Technical Report 1[1]. Final documentation shall include reflected ceiling plans, analyses, and renderings.

1.1 Concept

The purpose of the performing arts center is to bring people together to witness several forms of creative activity, in which artists use their body and/or voice to convey artistic expression. With this as a driving force, lighting for the Tobin Center will aim to create engaging environments that are welcoming to patrons and visitors. It will enhance the idea of having the opportunity and responsibility of supporting the goals of the Performing Arts Center in inspirational and pragmatic ways. To inspire and welcome, the lighting must resonate with the community and celebrate connections between the Tobin Center, the greater fabric of San Antonio, and the River Walk.

Equally, to realize its greatest potential, the functional and technical aspects of security, visibility and maintenance will be integrated into the design of the architectural and landscape lighting components.

1.2 Lutron Designer Comments

Charles Stone

- Liked my passion and inspiration for working on this particular building type; it shows a personal connection
- Fundamental problem with sketches
- Abstraction: looks nothing like this in real life
- The words into reality, and then you used other words later. Fewer words would be better or maybe limit it to one word.
- More glow where lines are for the words of the donor wall
- Don't just throw words on the screen
- Bubbles chandelier is 'all the rage' in the world
- Sketches need slight improvement
- In the end, it has to comply with the codes.
- Like custom chandelier for music schematic and custom dancer fixture for dance schematic in main lobby.

Lee Brandt

- Personal connection was great. Shows much more passion.
- Curved wall not always easy to wash

[1] Technical Report 1, Part II - Lighting Existing Conditions & Design Criteria

- It would be helpful to run multiple simulations to experiment with wall washing and hotspots, as designed in schematic. Explore if any of these schematics with the curve wall will work.
- Adjustable downlights on ceiling to light donor wall has too steep of an angle. Suggested to backlight the donor names, such as seen at the 911 memorial.
- Liked custom chandelier for music schematic and custom dancer fixture for dance schematic in main lobby.
- Instead of poles to hold the layers of the dancer, use aircraft cable.
- For all function layouts in the Patron's lounge, 4fc may not be enough.
- In main auditorium, cannot color change a red wall. Change it to white gypsum wall board and use color changing wall wash.
- Need help with indirect fixtures in the main auditorium ceiling. How necessary is it to light, if there are catwalks with theatrical lighting? Nobody will be looking up there.
- Not sure about balcony fascia with linear strips. Be careful they aren't too bright because it can be distracting.
- Event plaza should have been shown in layers of light, like the other spaces presented.

1.3 Main Lobby

The main lobby shall provide a strong visual and experiential connection between the historic entry/pre-ticketing foyer and the new auditorium. A curved wall, large concessions area, view of the Patron's Lounge, and a donor wall are architectural elements that make the space unique. As patrons and visitors move throughout the lobby, their circulation is more random than guided, due to the various points of interest.

With this being a large transition space, the design shall complement the materials and architectural features, while creating an engaging and welcoming environment and providing intuitive way finding. Based on the three schematic designs, the second option of "musical structure" was chosen as the preferred design due to personal preference and feedback from Lutron. The design option will feature a custom chandelier, inspired by the body and stem of a musical note. A combination of the three schematics will be further analyzed and developed to address the architectural elements previously mentioned. Additionally, flexible dimming capability will be a key feature to subtly inform patrons and visitors that a performance is about to begin.

1.4 Patron's Lounge

Located on the second level, the Patron's Lounge functions as a space for socialization, in which patrons and performers can congregate, as well as support donor accommodations and special events. Its architecture is unique but simple, for a structural glass wall support framing allows patrons to see below into the main lobby.

In relation to the concept of embracing the arts, it is important for this space to invoke an engaging and close conversation atmosphere, just the same as when performers engage their viewers. The lighting solution will then provide a relaxed impression, where non-uniform, low color temperature sources will be implemented for focal glow and ambient luminescence. Bubble chandeliers will also be provided for sparkle and stimulate the spirit of the arts.

1.5 Main Auditorium

The main auditorium can house 1,750 seats and is used for multiple configurations, such as theatrical productions, orchestral concerts, dance performances, films, amplified events, and lectures. Due to the space having a multipurpose nature, the lighting solution shall be visually pleasing and comfortable for occupants, especially for way finding before, during and after a performance. A flexible lighting system shall be addressed with performance-quality dimming and preset scene controls.

1.6 Event Plaza

The event plaza, known as "The Second Front Door," is located on the west side of the site, linking the San Antonio River Walk to the Tobin Center. It serves as an outdoor performance space to enhance the experience of events being held inside the Center, providing visitors a strong sense of exterior happenings and encouraging more city events. The lighting solution will take careful consideration of vertical illumination to properly render peoples' faces, as well as ensure safety and security as they circulate about the plaza.

1.7 Methods & Tools

For the final report and presentation, certain tools and software will be used to achieve and portray my designs. The following programs and method I propose to use are outlined below.

Schematic Design:
Illustrated through hand sketches and Photoshop, conceptual design will be developed and refined based on the suggestions from industry professionals. Illuminance recommendation levels will be taken from the IES 10th Edition Handbook.

Design Development:
Luminaire selections will be completed, as well as the design for custom fixtures when necessary.
Space modeling will be modeled in either AutoCAD or Revit Architecture. Models will then be exported into 3dsMax and AGI32 to perform all lighting calculations. Appropriate adjustment to the designs will be made according to the measurements.

Construction Documents:
Based on the calculations performed and adjustments made, final renderings will be completed to present in the report and presentation.

Final Submittal:
A final report and final presentation will be submitted.

2.0 ELECTRICAL DEPTH

The network consists of (4) four submersible, dry-type main service transformers, each rated at 13.8kV, 480/277V, 3-phase, 4 wires + ground. They are sized, controlled and engineered by the local utility company, CPS Energy. The main service from these transformers is provided through (2) two indoor, surface-mounted, single-ended main switchboards, MSB-1 & MSB-2, located in the electrical room of the basement. From each main switchboard, power is distributed to their designated panelboards. A 250kW/312.5kVA, 480/277V emergency diesel generator is used, along with (2) two automatic transfer switches to provide power for a house emergency lighting transfer system, (2) two large hall emergency lighting transfer system, and studio theater emergency lighting transfer system.

The electrical depth involves the redesign of the branch circuits for the four spaces, a short circuit analysis, and two depth topics.

Branch Circuit Design

Branch circuits will be redesigned for the main lobby, Patron's lounge, main auditorium, and event plaza. To accommodate the new lighting system and controls, lighting and equipment loads will be altered; therefore, feeders and panelboards will be resized for branch circuit modifications.

Short Circuit Analysis

A protective device coordination study will be conducted, addressing a single path through the distribution system. This path extends from the CPS Energy utility to a new lighting panel, LP-4AA. A short circuit calculation study will be conducted.

Electrical Depth I – Building-Integrated Photovoltaic (BIPV)

Photovoltaics are a promising renewable technology, in which it produces electricity on site, directly from the sun, without being worried about energy supply or environmental harm. The next generation of solar panels, however, will not only bear little resemblance to their predecessors, but they will consist of integrating photovoltaic modules into the building envelope.

The implementation of a Building Integrated Photovoltaic (BIPV) system will be studied. It can become an integral part of the Tobin Center, in which solar roofing tiles for the iconic, historic south façade, as well as the new addition of the building, are integrated. Instead of placing a photovoltaic array near the building site, a BIPV system will add architectural interest to the building. This portion of the electrical depth will study feasibility and cost effectiveness.

Electrical Depth II – Central vs. Distributed Transformers

The Tobin Center currently uses a series of distributed transformers for stepping down the voltage from 480/277V to either 208Y/120V or 218Y/126V. A study will be conducted to compare the costs, efficiency and other implications of replacing the distributed transformers with that of a central transformer system.

3.0 Mechanical Breadth/Sustainability

The mechanical breadth will include utilizing biogas as a renewable energy source for onsite use. Research will be conducted to understand how such greenhouse gases can be transformed into a power source and used as energy for electricity and heat generation. Further studies will focus on system implementation and interaction with the HVAC and power distribution systems.

4.0 Construction Management Breadth

Contributing to a possible implementation of a Building-Integrated Photovoltaic system, an in-depth cost and schedule study will be performed. Assembly estimates and actual supplier/vendor quotes will be presented, as well as comparative case studies of how this system can impact construction time and cost. These can provide insight on initial cost offsets and the amount of building materials and labor necessary.

5.0 Spring Semestr Schedule