

Project Proposal

The Sterling and Francine Clark Art Museum
225 South Street, Williamstown, MA 01267-2878

11 January 2012

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Executive Summary

The Sterling and Francine Clark Art Institute (The Clark) is an art museum and center for advancing the education of the arts. It's newest addition to the campus, and the focus of this project, is a plant and Visitor, Exhibition and Conference Center (VECC). The project, which was designed by Tadao Ando Architects and Associates, aims to create a facility that invites people of all ages to explore the arts. Spring work will focus on redesigning this facility through the following studies: lighting depth, electrical depth, mechanical breadth, and architectural/media depth.

The lighting depth will focus on the following spaces: South Terrace, Lobby, Retail, Multi-Use, and Woodshop. Pictures of these spaces are provided in figures one through five. Each of the lighting systems in these spaces will be redesigned and will support the intent of the architect as well as enhance the experience of the guest. The Electrical depth will also involve the five previously mentioned spaces and will include new branch circuit designs, a short circuit calculation, a comparison between an on site generator and a campus generator, and a diesel cogeneration study. The mechanical breadth will include designing a geothermal system based on the sizing of the current equipment. The integrated architecture and media breadth will involve the redesigning of a portion of the VECC to include an interactive area for families and children.

Building Overview

Description

The Sterling and Francine Clark Art Institute (The Clark) is a campus of buildings dedicated to increasing the public education of the arts. The scope of this study is the plant and Visitor, Exhibition and Conference Center (VECC). The VECC and plant are being designed by the world renowned architect Tadao Ando Architects and Associates. Consequently, the facility has a minimalist design approach with clean lines and a simple material palette. The spaces within the VECC and plant that will be investigated in this design project will be South Terrace, Lobby, Multi-Use space and Woodshop.

Building Statistics

Building Name: Sterling and Francine Clark Art Institute
Location and Site: 225 South Street, Williamstown, MA 01267-2878
Building Occupant Name: The Sterling and Francine Clark Art Institute
Occupancy: Utility Plant and Museum Space
Size: 78,000 SF
Stories above Grade: 1
Primary Project Team:

Design Architect: Tadao Ando Architects and Associates
www.tadao-ando.com/index_eng.htm
Architect of Record: Gensler
www.gensler.com
Landscape Architect: Reed Hilderbrand Associates
www.reedhilderbrand.com
MEP Engineer: Altieri Sebor Wieber, LLC
www.altieriseborwieber.com
Structural Engineer: Buro Happold Consulting Engineers, PC
www.burohappold.com
Civil Engineer: Guntlow & Associates
www.guntlowassociates.com
Code Consultant: Technical Solutions Associates, Inc.
www.techsola.com
General Contractor: Turner
www.turnerconstruction.com

Construction Dates

Excavation Start – 6.3.2010
 Substantially Complete (Plant) – 12.13.2011

Project Delivery Method: GMP

Building Images



Figure 1: South Terrace



Figure 2: Lobby



Figure 3: Retail



Figure 4: Multi-Use

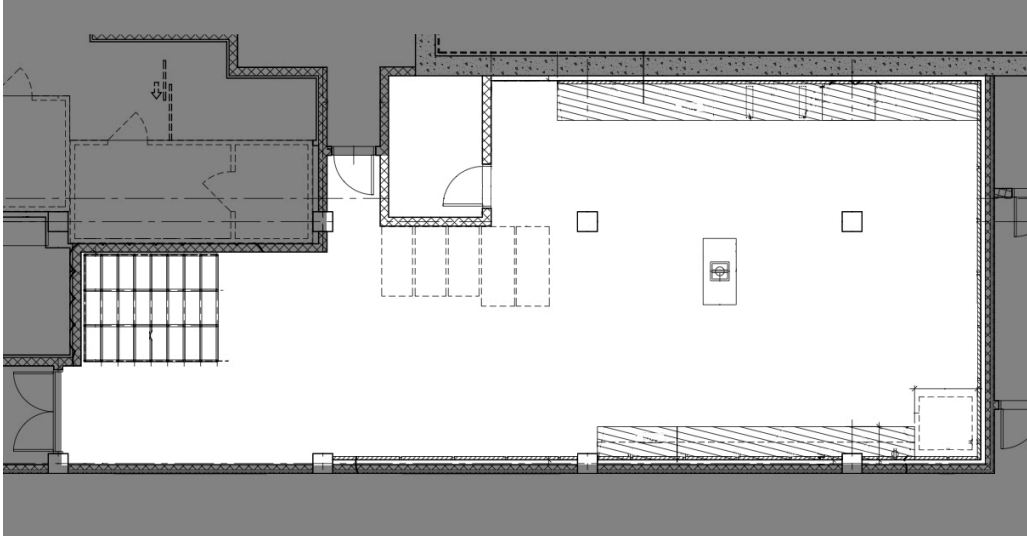


Figure 5: Woodshop

Lighting Depth

Overview

The lighting depth will concentrate on the re-design of the lighting systems for the South Terrace, Lobby, Retail space, Multi-Use, and Woodshop areas. See Figures 5 and 6 for the locations of these spaces. The lighting design will reflect Tadao Ando’s design principles and practices as well as create a pleasant space for the guests. The building is attempting LEED certification so the recommended quality and quantity of light will be supplied as sustainably as possible.

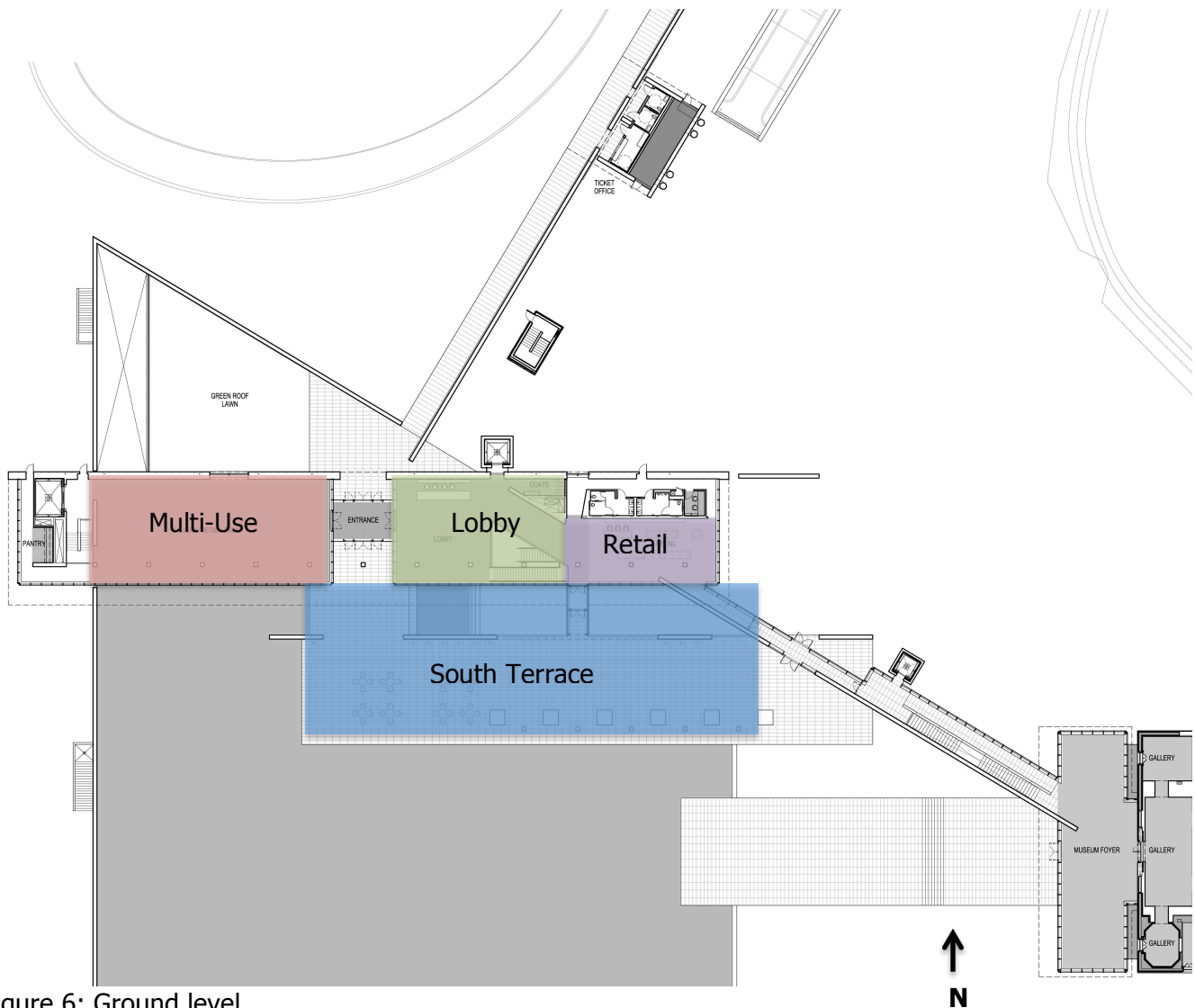


Figure 6: Ground level

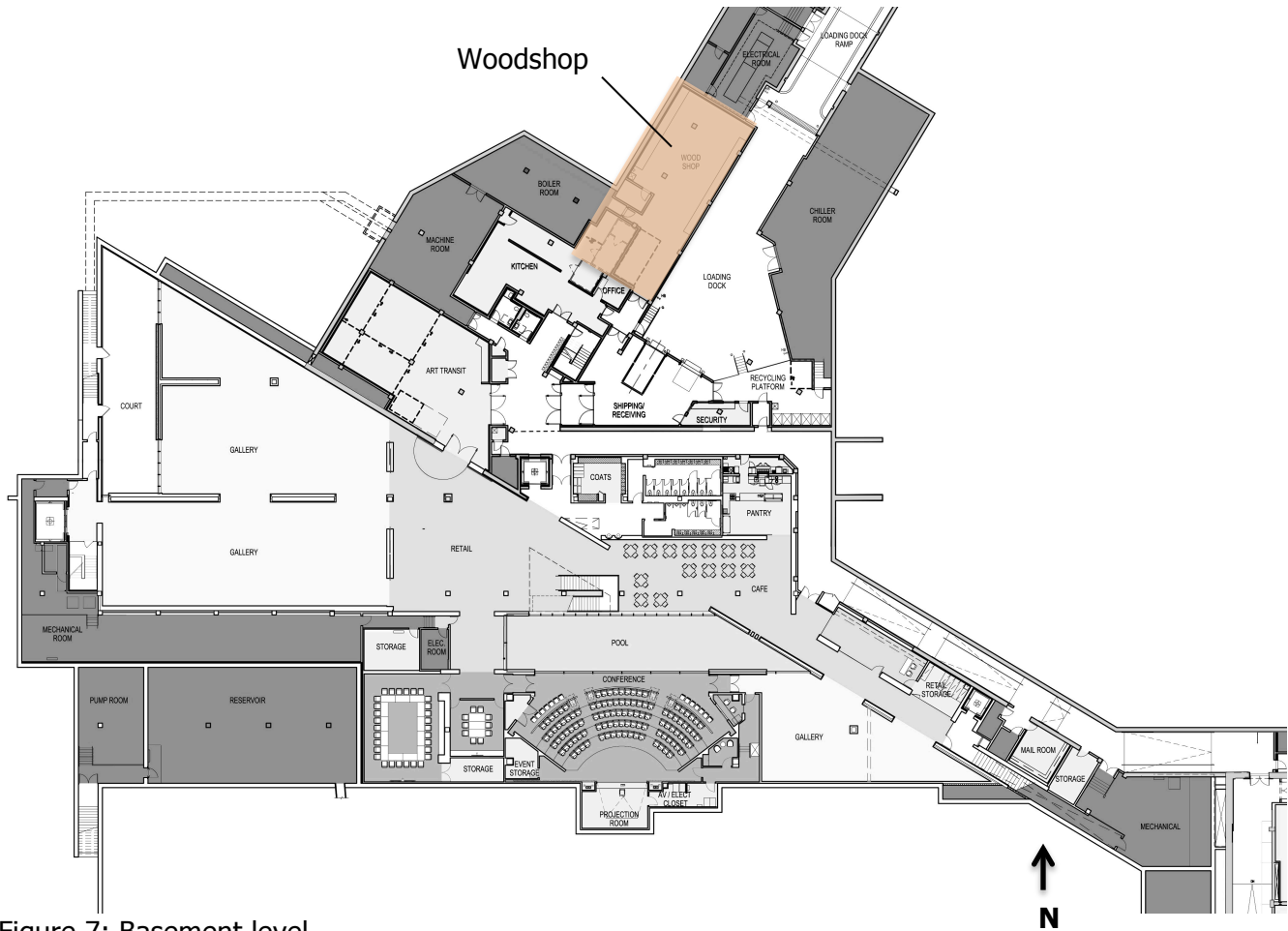


Figure 7: Basement level

Concept

The Clark plant and VECC is a facility that provides a clean, minimalistic backdrop to display the rich collection of the Clark’s art. The lighting will be based heavily on Tadao Ando’s emphasis on his favorite architectural element: the wall. The materiality, tactility, and emptiness that Ando’s wall are known for will be carefully considered and supported by the lighting design. The physical boundaries that the walls create (materiality), the appearance and texture of the wall (tactility) and the lighting and space that surround the guest (emptiness) are explored and provide a space that invites contemplation. The lighting in the space will reflect these attributes to help the guest have a pleasant experience.

South Terrace

The South Terrace is the boundary between the interior spaces and the reflecting pools. The clean hardscape which is constructed of architectural concrete, concrete pavers and granite veneer, weld the serenity of the interior environment together with the tranquility of the exterior. The lighting for this space needs to reflect the clarity of the architectural lines. Additionally, the lighting systems for the south terrace need to provide adequate illumination without causing excess light trespass and skyglow.

To accomplish this, a minimalistic washing scheme for the vertical surfaces, complimented by lighting the perimeter between the terrace and the reflecting pools will support the character of the space and

limit the amount of light pollution that is created. Reflected light, step lights, and light spilling out from the interior spaces will provide the functional light for the terrace.

Lobby

The extensive glazed curtain wall system in the lobby provides a well-lit, open atmosphere for the guest to enter into. The lighting designs for this space should continue this atmosphere into the night hours and should give the guest the impression of a public space. Lighting should be used to explore material and tactile nature of the concrete pavers, white architectural walls, and granite surfaces in the space explore the. Way finding is particularly important in the lobby, and the location of the reception desk and staircase need to be communicated appropriately.

The major element of the proposed lobby lighting design revolves around contrasting the materiality and tactility of the concrete and granite walls by washing and grazing respectively. Highlighting the surfaces around the staircase will draw the occupant to the attractions on the basement floor. Increased light levels around the reception desk will provide the functional light for the desk as well as guide the guest towards this area.

Retail

The retail space, which is located immediately adjacent to the lobby, shares the same south facing glazed curtain wall. The lighting for the space needs to build on the inviting and public atmosphere of the lobby as well as draw the occupant towards the merchandise. Adequate but non-damaging lighting needs to be provided to highlight the merchandise in the space. Additionally, the design needs to reflect the wall-based emphasis of the rest of the spaces.

The lighting design for the retail space will be similar to the lighting design for the lobby. Wall emphasis in combination with a track lighting system for the merchandise areas will be the defining systems for the space. Highlighting the granite wall next to the museum vestibule will be of specific importance for way finding in the space.

Multi-use

The multi-use space is used for a wide variety of events and is located opposite from the lobby, across the entrance corridor. A glazed curtain wall system composes the entire south wall of the space as well as most of the east and west sides, necessitating a system that will work well with daylight harvesting. The two main functions of the space: an art gallery and a meeting area, require the lighting system to provide adequate, uniform light as well as accent light for the artwork.

Design 1

The first design is a continued exploration into the materiality, tactility and emptiness that Ando's walls create. By simply washing the walls with light, the emptiness of the space remains. Additional lighting for conferences and freestanding art will be provided by recessed fluorescent light fixtures and a track lighting system. An easily controllable track lighting system as well as versatile track fixtures will fulfill the demanding lighting needs of the space.

Design 2

The second design concept involves backlighting the ceiling to provides a flexible base to allow partition walls to be rearranged without changing the location of lights. This minimalist approach brings

the focus off of the walls and onto the ceiling. No accent light will be provided on the artwork located on the walls or on the ceiling, instead relying on the abundant ambient light to illuminate the artwork.

Design 3

Like backlighting the ceiling, washing the ceiling with light also provides the multi-purpose space with a simple, clean look. The moveable partitions stop several feet below the ceiling, allowing for the possibility of up lighting the ceiling from the partitions. Additionally, third concept is to provide accent light where need for the artwork on the floor or on the walls by using a flexible track lighting system.

Wood Shop

Of the four spaces being designed, the wood shop is the only space to be located in the plant portion of the project. It is a backstage area used for packing and unpacking artwork. The space needs to be uniformly lit and should give the occupant an impression of visual clarity. The lighting concept for the space should reflect the utilitarian nature of the space and provide a solution that is cost effective.

Conceptually, the woodshop lighting design varies from those in the guest spaces in that it no longer focuses on the walls. This reflects the distinction between the guest and backstage areas. Instead of focusing on the walls, the lighting design focuses on the ceiling, creating planes of light and dark in between the concrete beams. These planes of light will be created by linear fluorescent fixtures mounted in-between every other or every third beam. The light bouncing out of the voids in the ceiling will have approximately a lambertian distribution and uniformly distribute light across the work plane. Additionally, task lighting mounted underneath the cabinets will provide light for the work benches and provide the space with some peripheral emphasis.

Methods, Tasks and Tools

Schematic Lighting Design

Conceptual design will be guided by general lighting knowledge, the IES handbook, and feedback from industry professionals

Modeling of spaces

When needed, the spaces will be modeled in Revit and exported to 3DStudioMAX for renderings. Less detailed models for calculation purposes will be modeled in AutoCAD and then exported to AGi32.

Design Development

Once the concept and schematics have been refined, fixtures will be selected. Fixtures will be placed in the lighting calculation models to verify the quantitative aspects of the design and then placed into the 3DStudioMAX model to verify the aesthetic and qualitative aspects of the design.

Calculations

Lighting calculations will be done in AGi32. Additional calculations for ANSI/ASHRAE/IES Standard 90.1 and LEED will be completed by hand or via Excel.

Final Documentation

Final renderings will be provided using AGi32 and/or 3DStudioMAX. Lighting plans and diagrams will be created in AutoCAD. Renderings and diagrams will be exported to Adobe's Creative Suite for graphics revision. Reports and presentations will be provided using the Microsoft Office suite.

Professional Feedback

1st Presentation

Kari Comment's

- Exterior lighting concept close to original
- How can you "enhance" emptiness?
- Like accent at tops and bottoms in lobby didn't like in between the walls. Every wall is a display wall in museum
- Building lighting into partitions will be difficult.
- How is multi-use space going to adapt under different uses?
- Woodshop is just a woodshop; it is a dirty area. You can use 4ft linear fluorescent because it is not a pretty area. It is used to build and break down crates. Mounting is done in a really clean mounting area. Woodshop is back of house; don't spend too much money there.
- Tadao Ando always uses a 7 in his buildings. Think about this.

Shawn Good

- Liked sketching presentation style
- All views easy to understand
- Show tools with renderings, not afterwards.
- Liked that the arch background was explained
- Lighting edge of pond is it just the edge of the terrace or all the pools?
- Blending light from inside to outside; you control how much comes out.
- "Enhance" empty in slide 8 by just highlighting the back wall
- How can you simplify to how Ando does
- Perimeter lights you have a line of light shown the window mullions will become light will create a brighter interior and exterior
- First design for multiuse space focused on the walls
- Design 2 and 3 focused on ceiling
- Woodshop is ok because you used basic linear fluorescent

Sandra

- Good job with terrace
- Background on arch, art was a good thing
- Appreciated Shawn and Kari's comments "less is more." Back off some of your designs a bit to become more simple
- How will you address looking out through the glass to the reflecting pools?
- Graze exterior wall to soften it.
- Dark granite wall will absorb a lot of light
- Floor plan brown colors are hard to see
- Don't focus on the perimeter its self
- Likes light in coffers in woodshop don't really need to do much but good simple approach
- Light other pools

Questions for Panel

Q: How does Ando's seven fit in?

A: Idk what to go with the seven but is significant because it's the first thing you see the back side of the seven. Solid wall at the top of the seven

Q: Will exterior be dark and creepy without washing the exterior walls? Exterior terrace what to

A: The walls will be in silhouette

Presentation 2

Brent

- Liked the building up of the theme
- Have more enthusiasm
- Liked the simplicity of the design
- Liked hiding the sources
- Show the materials (concrete wall) not just say it
- Put fixtures with renderings
- Which of the three designs do you like the best?
- We likes the 1st
- Layer elements together in the multipurpose

Andrea

- Presented well
- Very clear in presentation
- Need to emphasize that it is a space to appreciate art
- Lighting is always about people, not "the occupant"
- Too much money to spend on wood shop
- In multipurpose, would have wanted you to say that ceiling is too flat
- Put emphasis on art
- Didn't like second approach
- Good sense of light application

Lee

- Look more into Ando's work
- How would Ando do it?
- Consider lighting the trees on terrace
- Materials are critical
- Contradicted yourself by talking about no light trespass on site, but said you want it from building
- Won't be able to see outside with overhead perimeter lighting
- Where was ambient light in lobby?
- Look at difference between wall washing and grazing
- Label concepts in multipurpose
- If you didn't like the up lighting ceiling concept then why did you talk about it?
- Look at walls in multipurpose space
- Think about multipurpose space more
- Whitewash walls in shop
- Be architect

Electrical Depth

Spaces

South Terrace

The south terrace is the border between the building and the reflecting pools extending to the south of the building. The existing lighting uses metal-halide lamps for the major source of illumination and LEDs to illuminate the landscaping and the pool edge. The proposed lighting will use LED and metal-halide sources for the hardscape and LED sources for the pool edge.

Lobby

The lobby is located adjacent to the central entrance vestibule. The existing lighting consists of a recessed linear fluorescent system and recessed halogen wall washers and down lights. The proposed lighting design will use recessed fluorescent fixtures for ambient light, LED wall grazers and metal-halide down lights.

Retail

The retail space is located immediately west of the lobby. The existing lighting uses a linear fluorescent system for ambient light and a track system for merchandise light. The proposed lighting design will use linear fluorescent for wall emphasis, a track lighting system for the merchandise and recessed fluorescent fixtures for ambient light.

Multi-Use

The multi-use space is located adjacent to the central entrance vestibule but opposite to the lobby. The existing lighting consists of halogen down lights, a linear fluorescent ambient light system and a track lighting system. The proposed lighting design will use a linear fluorescent ambient lighting system a linear fluorescent wall washing system, and a halogen track lighting system.

Woodshop

The woodshop is located on the basement floor and is considered a backstage area. The existing lighting is provided by suspended linear fluorescent fixtures. The proposed lighting design consists of surface mounted linear fluorescent fixtures in combination with LED task lights.

Short Circuit Analysis

I will be doing a short circuit analysis between the utility primary, PHMB, PSA1, PSDB and PPS2.

Electrical Depth I: On-site generator vs. campus generator

The Clark currently operates with a campus generator. With the addition of the VECC and a new plant, the existing campus generator will be replaced. The new one is to be located in the plant portion of the project. Purchasing and installing a large campus generator instead of one to support just the new construction is initially more costly. I will study and compare the energy use and financial results that come from adding a generator to supply solely the plant and VECC instead of the entire campus. I will compare the long-term cost of maintaining two generators with the cost of purchasing and installing a larger generator.

Electrical Depth II: Engine co-generation

Because The Clark has a campus electrical system, I am going to look at how much money and energy can be saved by using a full time engine or micro-turbine for cogeneration. This system would reduce

the cost of purchasing power, but would require a significant initial investment. The benefits and disadvantages of cogeneration for The Clark's campus will be studied.

Breadth I - Mechanical

The mechanical portion of the project will involve designing a geothermal heat recovery system that will serve the Clark Campus. The system sizing will be based off of existing equipment capabilities. Drafting and modeling will be completed to show the location of the geothermal field on the campus. Calculations will be made to ensure that the geothermal system meets or exceeds the current heating and cooling needs of the campus.

Breadth II - Architectural and Media Design

The Clark places a high importance on the activities and programs geared for families and younger audiences. This breadth study will support this emphasis by redesigning a portion of the area on the basement floor to include a learning environment specifically created with children and families in mind. A sample interactive media exercise will be created as an example of how the space could be used. The space characteristics will be described via computer modeling and architectural drafting. A video of a sample activity or showpiece will be created using openFrameworks.

Schedule

AE Thesis Spring Schedule		
Week	Focus	Activity
9-Jan	Lighting	Review Lutron comments and finalize schematic lighting design
	Arch/Media	Precedent studies for interaction center and openFrameworks
16-Jan	Lighting	Build basic AGI models for all spaces and finalize design
	Electrical	Outline "Tech 4" and complete writing sections
	All	Obtain complete building model files
	Mechanical	Research for geothermal systems
23-Jan	Lighting	Select tools for lighting system and proceed with design development
	Arch/Media	Layout interaction center and begin programming
		Milestone 1 (1/27): Lighting criteria are met and verified in AGI
30-Jan	Mechanical	Calculation of geothermal system
	Mechanical	Documentation of geothermal system
6-Feb	Electrical	Start and finish electrical breadth (campus generator study)
		Start and finish electrical breadth 2 (cogeneration study)
	Electrical	Preliminary Submission #1 (2/10): Electrical
13-Feb		Milestone 2 (2/13): Mechanical breadth is substantially complete
	Lighting	Finalize lighting design
20-Feb	Lighting	Create 3ds models for Lobby/Retail and Exterior Space
27-Feb	Arch/Media	Finalize and document interactive space architectural changes
	Lighting	Create renderings for all spaces
		Milestone 3 (3/2): Lighting designs are completed and documented
5-Mar	Spring Break	
12-Mar	Arch/Media	Finalize programming of media center and document
	Electrical	Begin electrical depth
	Electrical	Preliminary Submission #2 (3/16): Electrical
19-Mar	Electrical	Finish electrical depth
	All	Revise report
	All	Begin presentation
26-Mar		Milestone 4 (3/26): Final report is substantially complete
	All	Presentation is substantially complete
2-Apr	All	Finalize report
	All	Finalize presentation
		Final Written Reports Due (4/4)
9-Apr	Faculty Jury Presentations	
16-Apr		
23-Apr	Senior Banquet Presentations (4/27)	
30-Apr	Finals Week	