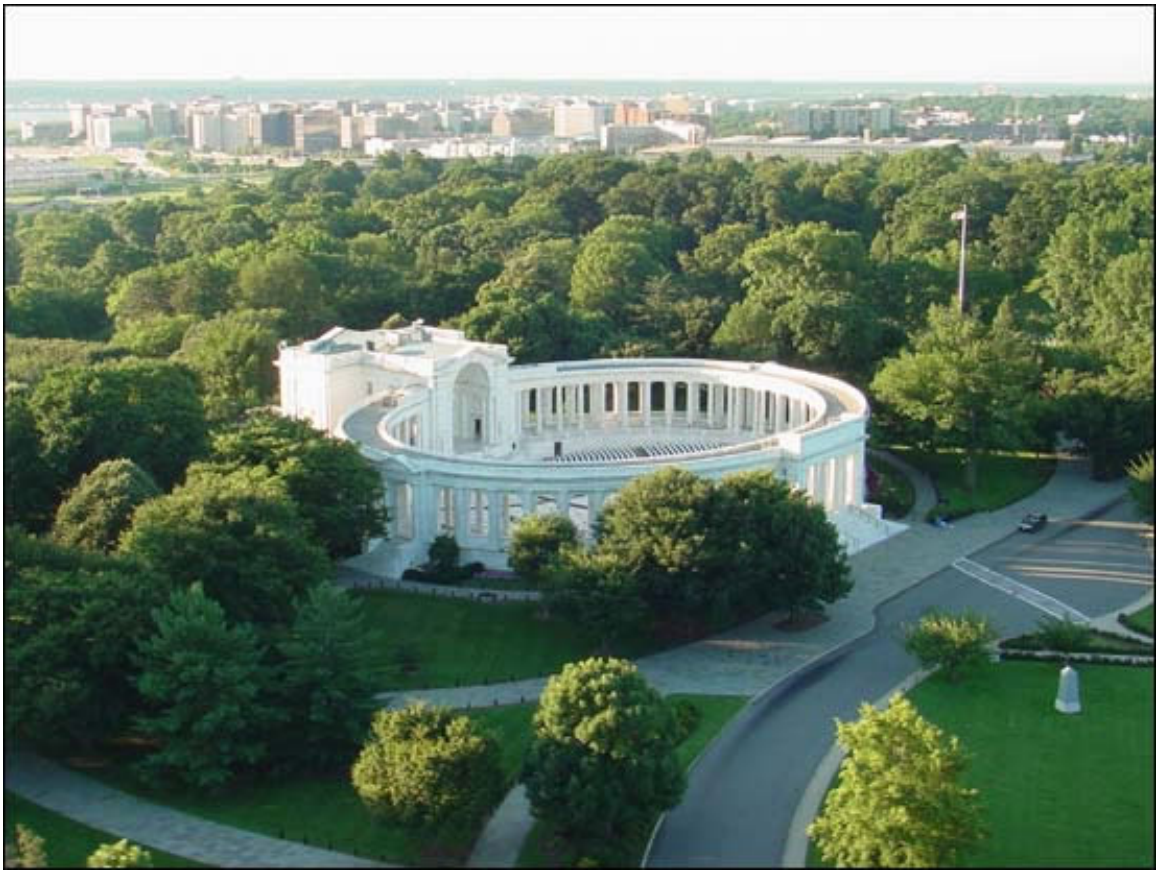
The Memorial Reception Building
Arlington National Cemetery



Thesis Proposal

Jennifer Sanborn

February 7, 2007

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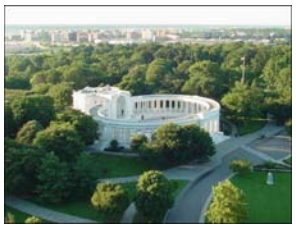
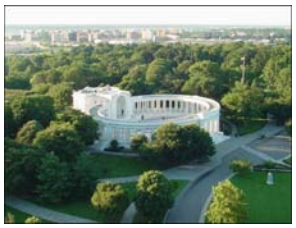


Executive Summary

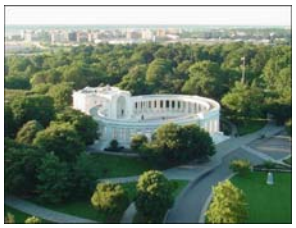
The proposed thesis will include a lighting redesign of the reception room, work area, crypt chapel, and the amphitheater. The redesign may include new fixtures, lamps, ballasts, and controls. All calculations necessary and computer modeling will be completed to ensure the design will correspond to ASHRAE 90.1 and the IESNA guidelines. This thesis will also include an addition to electrical power in the amphitheater as well as sound control abilities. Resizing of the electrical system will be done if the new load requires it. A generator will also be sized for all emergency lighting which is currently using emergency battery packs. Finally, an acoustical analysis will be completed for the amphitheater to ensure power outlets are placed correctly, and a historical analysis will be done to ensure all regulations are abided by and not over looked.



Background

The Memorial Reception Building is located in Arlington Virginia and approximately 50,000 sq. feet. There are 3 floors total which include display space for awards and honoree items, offices, tomb guard living quarters, a chapel, and a very large amphitheater. The tomb guards are here around the clock during certain shifts and the building is open to the rest of the public when the cemetery is open, which is everyday of the year from 8am till dusk.

The building's architecture is based off of classical architecture from the Greeks and Romans and is a historical landmark. The building recently went through a renovation reorganizing the basement floor plan, fixing and cleaning some of the marble throughout the building, and re-working the mechanical and some of the electrical and lighting systems.



Depth Proposal - Lighting

Problem

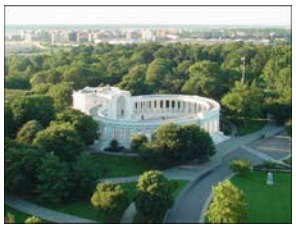
A lighting concept must be design for all three spaces that will satisfy the task requirements of this space as well as conforming to ASHRAE 90.1 and the IESNA guidelines. The design must also be aesthetically pleasing and correspond to the design criterion developed for each type of space. Further more, the spaces should have correct vertical illumination and a horizontal illumination per the IESNA guidelines. Finally, the design should enhance the classical architecture of the space as it is a very important piece to the building while abiding by historic regulations.

Solution

Fixtures and lamps will be chosen for each space to enhance the space's aesthetic quality. Since this building is a historic landmark, the fixtures will be placed out of site or hidden to the best of my ability for every space it is required for based on the design criterion and historical requirements. Great care will be taken to make sure all the fixtures that will be viewed by the occupant will match the classical feel of the building as a whole. All my schematic design ideas for each space are located under the technical assignments tab on my CPEP page for your viewing.

Solution Method

The lighting design for this space will be analyzed through 3d modeling and rendering to guarantee the design is aesthetically pleasing, the design criterion is met, and that it conforms to the IESNA guidelines. Once IES files are gathered for all the fixtures and lamps that I will be proposing to use, my rendered AGI32 model will be used to portray the best portrait of what the space will then look like. Control systems will then be chosen that will best suit the space as well as calculations will take place to make sure it complies with ARSHAE 90.1. Final plans, sections, and cut sheets of: lamps, ballast, control stations, and luminaires, will then be compiled to be handed in as part of my final report.



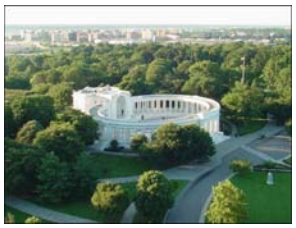
Tasks and Tools

Task 1: Finalize lighting design
- Create appropriate mood and feel of the space
- Satisfy IESNA design guidelines

Task 2: Select Fixtures
- Acquire cut sheets from catalogs that would help create the desired mood of the space
- Specify lamp types and wattages while keeping the power density under the allowable wattage
- Select appropriate ballasts

Task 3: Luminaire Layout
- Update plans and sections with locations of new fixtures, controls, and correct aiming

Task 4: Software Modeling
- Update 3d AutoCAD models for each space
- Import new 3D portions into AGI32 and delete any obsolete ones
- Select appropriate IES files, aim fixtures, and run calculations
- Analyze the results



Depth Proposal – Electrical

Problem

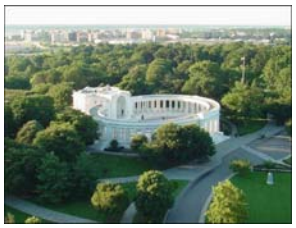
Currently the electrical power distribution is sufficient, but after the lighting redesign is implemented and a large area of new lighting fixtures and power outlets are added to the system, it might not be adequate for the increased load that is being added. These expansion issues with the increased load will need to be addressed and the system and wires may need to be resized. Also, the emergency back up system will need to be assessed to ensure the most efficient and appropriate type of back up is being used for all emergency lighting.

Solution

Lighting fixtures, power outlets, sound control devices, and lighting control devices will be added to the amphitheater to give this space a more versatile operation with lighting and sound. Calculations will need to be done to ensure the new load does not exceed existing allowable distribution system load. All battery packs, which are currently connected to all emergency lighting fixtures within the building, will be removed. A generator will be added to operate all emergency fixtures within the building and all new emergency fixtures outside the building. The generator will need to be sized appropriately to ensure it can handle the load of the redesign.

Solution Method

The new loads in the amphitheater will be calculated to check to see if the building systems size is adequate and to make sure all the wires are sized appropriately. The calculations will be computed using the 2002 National Electric Code guidelines and will include all correct demand factors. Wires and conduit sizes will be calculated based off the table provided in the NEC for this new design load and compared to the existing ones to decide if the new load exceeds the current sizes. Calculations will be done to correctly pick out the appropriate size for a generator which will now feed all emergency fixtures inside and outside the building.



Task and Tools

Task 1: Calculate Loads
- Calculate new system load which will include all new fixtures, power outlets, and lighting and sounds controls.
- Calculate emergency lighting load

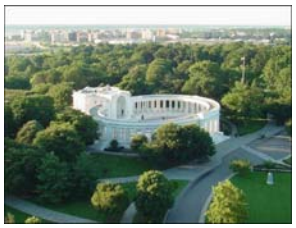
Task 2: Specify Panel Boards
- Place all new amphitheater loads onto a new panel board and size
- Place all new interior lighting loads on existing panel boards in spare or old lighting spaces and resize
- Size over current protection for any changed or new panel boards

Task 3: Plans
- Show all wiring for electrical loads and lighting loads on floor plans

Task 4: Specify Circuits
- Size conductors using the 2002 NEC guidelines
- Size conduit using annex C in the 2002 NEC

Task 5: Generator sizing
- Size the generator to hold all emergency lighting using the 2002 NEC guidelines

Task 6: Protective Device Coordination
- Determine appropriate sized over current protection devices



Breadth Work – Trade Coordination

The work area in the basement has a drop down ceiling which I would like to either take out or move up to create a cove area in this space. This cove area would allow me to integrate my cove lighting design for this room. By doing this though, there are a couple of ducts that will need to be moved, and the air supply and return into this space would have to be redeveloped. The area above the ceiling will have to be redesigned to allow accurate space and placement for these ducts and pipes as well.

Breadth Work – Acoustical

Since a sound control system will be added to the amphitheater there is a need for electrical outlets throughout the space for speakers that will be contracted out for each event. An acoustical analysis will need to be performed to place all outlets in appropriate locations in order to minimize the cord usage throughout the amphitheater. One thing that will also have to be taken into consideration during the analysis is the placement and mounting of the speaker box as to not take away from the architecture of the surrounding space but allowing ample sound to the space.

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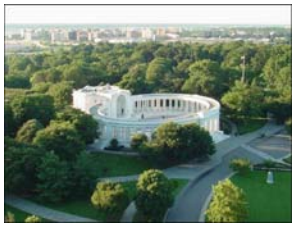

Week	Objective
Christmas Break	Start researching historical regulations for my architecture breadth
01/15-01/21	Update 3D AutoCAD models and start to look for fixtures. Start amphitheater model. Finish historical research.
01/22-01/28	Update models in AGI with new reflectance values and finish fixture selection with cut sheets. Collect all IES files and bring them into AGI. Continue to work on amphitheater model.
01/29-02/04	Place fixtures in AGI models and plans. Have AGI compute foot-candle levels on appropriate surfaces. Start placing loads on panel boards and calculating new lighting load. Begin acoustical analysis in amphitheater. Continue to work on amphitheater model.
02/05-02/11	Compile nice looking renderings for next week preliminary submittal of two spaces. Finish amphitheater model. Finish acoustical analysis and begin placing electrical outlets appropriately. Calculate new amphitheater electrical load and place them on panel boards and plans.
02/12-02/18	**02/16-Preliminary submittal of 2 lighting spaces.** Bring in amphitheater model into AGI and change all reflectance values. Bring in IES files into AGI model and place fixtures in model and on plan. Calculate foot-candle levels where appropriate for amphitheater and calculate new amphitheater load. Start calculating new system load.
02/19-02/25	Start compiling nice renderings for amphitheater and final space. Finish calculating new system load and start resizing wires, transformers, and any other equipment were required.
02/26-03/04	Finish resizing wires, transformers, and any other equipment that might need it. Calculate all emergency lighting loads. Begin plans for wiring the non-emergency lighting and emergency lighting loads as well as the plans for the new electrical loads.
03/05-03/11	Size the new generator based on the emergency lighting load. Finalize all lighting and electrical plans with wiring.
03/12-03/18	**Spring Break**-Finish anything that still needs to be completed.
03/19-03/25	Begin final thesis report.
03/26-04/01	Finalize thesis report and begin working on final presentation.
04/02-04/08	**04/06-Submit final report.** Continue working on presentation.
04/09-04/15	Finish presentation and begin to practice it.
04/16-04/20	**Final thesis presentations.**