

The New York University Concourse Project

New York City



THESIS PROPOSAL

Lighting | Electrical | Breadth Topics

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December 15, 2008

Executive Summary

This proposal covers the lighting, electrical, two breadth topics, and master breadth for the spring semester thesis.

The lighting depth study involves redesigning the lighting system for the four spaces of the New York University Concourse Project: Gould Plaza, Tisch Lobby, Classroom, and MBA Student Lounge. The new design will help resolve some of the issues the current New York University students face: pride, cognitive health, way finding/orientation, and physical health. Comments from lighting designers in the industry will help further develop the proposed schematic lighting design.

The electrical depth study involves redesigning the electrical system. A protective device study coordination will address a single path of the electrical system. A study involving the installation of a backup generator in Tisch Hall will be designed to meet the backup energy load. Last, a photo voltaic system will be developed to generate power for Tisch Hall.

The first breadth topic involves the integration of a water harvest system in Gould Plaza. The proposed water harvest system will help water urban greenery and flush toilets. The second breadth involves developing a mechanical system to deliver the captured water from the rain water harvest system to the various parts of the building.

The master breadth involves designing an efficient daylight delivery system for the Tisch Hall lobby façade to provide quality daylighting to the building interior.

Lighting Depth Proposal

Program Statement

The lighting design for the New York Concourse Project should strive to enhance the learning experience of students at New York University. The lighting design will address many issues that current students face. Like a musical symphony, lighting will endow rhythm, hierarchy and intensity of volume to the lighting for the building, a crescendo of smooth transitions that dictates the atmosphere and pace of an environment.

Issues that current students face

- Pride - Lack of school identity, NYU buildings spread throughout the city
- Cognitive Health - Stress due to the competitive nature of the business school and New York City
- Way-finding/Orientation - Congested traffic throughout the building
- Physical Health - Lack presence with connection to nature and daylight

Gould Plaza

Existing Conditions

The lighting systems in Gould Plaza consist of five 100W exterior bollards that are positioned around KMC. Within the exterior of KMC, there are metal halide downlights and uplights lighting the columns and exterior façade of KMC. In front of Tisch hall, there are 3 high pressure sodium lamps positioned right above the entrance. On the side of Weaver Hall, 14 wall mounted high pressure sodium lamps make up the lighting of the exterior façade.

Proposed Solution

The proposed lighting solution for Gould Plaza consists of ingrade luminaires that defines the directional path in the plaza. The path of lights directs students to the entrances of Kaufman Center and Tisch Hall. The lighting solution is designed to address the safety issue for students to see at night. The lighting solution also addresses the lack of New York University school identity by lighting a NYU logo at the heart of the plaza.

Lutron Presentation Comments from Designers

Lee Brandt

- Exterior organized well, lost connection between music & business
- Need to light vertical people
- People are going to want to be here and feel comfortable
- Logo lighting is weird on people's faces
- Between Tisch Hall and Weaver Hall, can potentially include more lighting
- Tisch Hall downlights will do nothing for glass
- Wash of light – glow within

Sandra Stashik

- Will you see the stairs if you have downlights?
- Light died to the left of entrance
- Need more than one layer of light
- Accenting building, concern with left side of building
- Sconces are too far away
- Interior spaces will have light at night
- Strong Verticals, problem with image not feeling safe

Solution Method

An additional lighting system will need to be introduced to provide vertical illuminance to students walking through the plaza at night. The light levels between Tisch Hall and Weaver Hall may be too dark. The solution to the problem might be adding light poles or ingrade luminaires to uplight proposed trees for the plaza. With this solution, it would be safer to walk between Tisch and Weaver Halls.

Tisch Lobby

Existing Conditions

The lighting system in Tisch Lobby consists of 9 types of luminaire. The fluorescent and high intensity discharge lamps fit well with the cool surfaces (grey limestone, ceramic flooring, and white eggshell finish) of the space. At the two revolving doors of the lobby, eight ED17 metal halide downlights are used to light the entrance. The center of the lobby, 24 metal halide downlights light the elevator waiting area and the stairs that lead down to the upper and lower concourses. On the west and east sides of the lobby, a combination of PAR 38 metal halide washwallers and ED18 downlights make up the lighting. The lobby also has staggered fluorescent strips that light the inner coves of the ceiling, creating a welcoming and relaxing atmosphere in the lobby.

Proposed Solution

The proposed lighting solution for Tisch Lobby includes using a number of decorative pendants to complement the modern architecture. Various surfaces are lit to create a lighting hierarchy in the lobby. At the center of the lobby, downlights are used to provide the space with general ambient light levels.

Lutron Presentation Comments from Designers

Lee Brandt

- Lost with plan. Save pendants with rendering
- Won't see hallways – not good hierarchy
- Your head won't turn to corridor
- Show light on wall/portal for the corridors
- Make sure pendants are enough for the stairs
- Lost back wall
- Wash wall near elevator
- Will see through space at night
- Rendering – great idea

Sandra Stashik

- How people be drawn to hallways?
- Rendering is very helpful
- Overwhelming with all pendants – missed downlight concept
- Careful with floor plan & show decent pieces with downlights
- Rendering is beautiful – worth about variation & ceiling heights
- Show a reflected ceiling plan to show changes in height

Solution Method

The proposed solution will need to be reworked to create a better light intensity level guidance in Tisch Lobby. Lighting equipment will also need to be added to light the stairs to the upper and lower concourse.

Classroom

Existing Conditions

The lighting system in the classroom consist a mixture of louvers, wallwashers, and slot luminaires. All three luminaires use a standard 28W T5 fluorescent lamp at 3000K. Since the desks in the classroom are arranged in a semi-circular format, the lighting design needs to light the surface of the table. The solution from Cline Bettride Berstein is to spread out the forty two 1' x 4' louvers throughout the classroom. The direct and indirect illumination on the walls helps make the space appear brighter.

On the north and south side of the classroom, 20' of recessed wallwashers are used to wash the walls. At the front of the classroom, 28' of the same type of recessed wallwasher are used to light the white boards. At the back of the classroom, lensed fluorescent strips are placed in a slot to light the wooden credenza and cabinets. The lighting controls in the room are digital switches

Proposed Solution

The proposed lighting solution for classroom consist a number of downlights spread throughout the classroom to provide general lighting on the writing plane. At the front of the class, wallwashers are used to provide illumination on the chalkboard.

Lutron Presentation Comments from Designers

Lee Brandt

- Bored with room, picture doesn't show ceiling
- Architecture not known
- Light walls – downlights are not enough for speaker

Sandra Stashik

- Speaker not lit
- Nice simple concept – don't forget adjustable spots for speakers
- Nice controls
- 4 dimming zones / 3 dimming zones
- Want no light on screen but light for speaker
- Nice to have something on the walls?

Solution Method

A lighting system to light the speaker at the front of the room will need to be added. The walls of the classroom will also be lit.

MBA Student Lounge with Three Options

Existing Conditions

The lighting systems in the student lounge consist of only fluorescent and LED sources. The 28W T5 fluorescent strips are arranged in a playful manner that defines the relaxing and fun atmosphere of the student lounge. At the center of the lounge, 15 compact fluorescent downlights are positioned right above the desks. There are also compact fluorescent wallwashers aimed at the center walls. In the pantry area, there are under cabinet linear fluorescent under the cabinets.

Proposed Solution

The proposed lighting solution for the MBA student lounge consists of three solutions: Coffee House, Outer Space, and Nature theme.

The “coffee house” consists using adjustable downlights to accent artworks on the wall. There are also decorative pendants used to bring out the feel of the coffee house.

The “outer space” design consist a variety of decorative pendants and suspended point sources to resemble space and stars in the sky. A blue wall is washed to mimic earths blue horizon.

The “nature” theme consist of using custom luminaires to resemble leafs on the ceiling to bring out the feel of nature.

Lutron Presentation Comments from Designers

Lee Brandt

- Lounge great concepts
- Coffee liked the best
- People feel weird with all green lights
- Careful your lighting the space
- Highlight green walls with nature
- Nature stretch – need irregular shoots of grass
- Space concept middle space too bright, concerned with ceiling heights
- Fake daylight with glass, play architecture
- Create fake windows

Sandra Stashik

- “Coffee House”, great idea
- Great ideas, great showing zones, 3 different ideas
- Nice concept pulling things together, need a plan before lighting layers (RCP)
- In rendering – more helpful to show a gradient for cove to show direction of cove light
- “Outer Space” – very fun great fixtures to reinforce ideas
- Washing out star spaces
- Bluewash – LED?
- Middle part may be too bright, might want to dim
- “Nature” – leaf idea needs more though
- Metal with cut-outs? – Insets with light? Too complicated
- Playful element- Green objects to glow? Do both? All acrylic?
- Block leaf objects? Add downlights?
- Nice job lighting different areas with concept, very nicely done

Solution Method

- “Coffee House Design” – Downlights will need to be added to provide general ambient lighting.
- “Outer Space Design” – Need to rework the center section of the lounge, need to either dim the lights or introduce a lighting system that will not be too bright.
- “Nature Design” – Rework the custom panels in the lounge. The architecture in the space can also be reconfigured to cope with the theme of nature. Shoots of grass made of acrylic glass can be proposed on the sides of walls at the entrance of the lounge.

Solution Methods

Tools

Computer programs will be used to model and analyze the lighting solution for the spaces. Lighting programs such as agi32 will be used to calculate the lighting levels for the spaces to meet the requirements of IESNA/ASHRAE 90.1 2007. Other programs such as autocad and 3d studio max will be used to model the space to give a rendering of how the actual space will look with the integrated lighting solution.

Task

- Revise schematic design with lutron lighting designer input
- Summary of design concept for the spaces
- Design Development: Pick out lighting luminaires that fit with the design intent
- Perform lighting calculations with selected luminaires
- Calculate energy requirements to meet standard 90.1
- Create renderings of the spaces with autocad and 3d studio max
- Documentation: Document final design plans, luminaire schedule, specification sheet, design summary

Electrical Depth Proposal

Problem

The electrical system for Tisch Hall will need to reconfigure to incorporate the redesigned spaces of Tisch Hall. Studies and analysis will be performed on the redesign to find the advantages and disadvantages of the new system.

Four spaces that will be re-lighted

The four spaces that will be re-lighted are the Tisch Lobby, classroom (upper concourse-UC31), MBA student lounge, and Gould Plaza. The branch circuit distribution will be re-designed for all the spaces to integrate with the existing electrical system.

Short Circuit Analysis

A protection device study with short circuit analysis will be calculated along the path of the main co-generator switchboard to the distribution panel board. The study will address the protection device that needs to be on the redesigned system.

Electrical Depth Topic 1: Install an emergency backup generator in Tisch Hall

The current emergency power system is supplied through the existing system which is not located in the renovated Tisch Hall. A separate emergency backup generator will be proposed to be installed in Tisch Hall. A room will need to be found for the proposed backup generator. The emergency power generator will need to power up emergency equipment as well as have extra power loads for future expansions.

Electrical Depth Topic 2: Using a photo voltaic array to generate power

In an urban dense place like New York City, power is valuable. Mounting photo voltaic panels on the roof of Tisch Hall may help generate power to reduce the power demand. Tisch Hall is located in the northern portion of the downtown area. Buildings surrounding Tisch Hall are not very tall to block sun light. A photovoltaic system can be designed to generate power that can be integrated into the electrical system. Photovoltaic systems will be placed based on the ideal direction to harvest the most amount of sunlight. Calculations on electrical savings will be calculated for a payback period.

Tasks and Tools

The tasks involved will be redesigning the branch circuits. A protective device coordination study will also be addressed for a single path through the distribution panel with calculations of short circuit current. A redesigned emergency backup generator and photo voltaic system will be installed to help benefit the electrical system in Tisch Hall. For designing a photo voltaic system, tools such as sketchup and agi32 will be used to help find the best suitable location for the photo voltaic mounting locations. Calculation grids will be setup in agi32 to find the location with the most amount of daylight (on the roof). The surrounding buildings will be constructed in sketchup to see if any surrounding buildings will block the daylight. In terms of backup generator, I will look through various backup generator catalogues to see which backup generator will fit the needs of the power demand. I will also find out how to integrate the backup generator into the existing power system.

Breadth Depth Proposal

Breadth Topic 1: Rain water harvest system

New York City is one of the most densely populated cities in the world with heavy water usage. A rainwater harvesting system can be designed on Gould Plaza to accumulate water for storage and can be recycled to water urban greenery and flush toilets.

Breadth Topic 2: Mechanical system to deliver water from captured rain water harvest system to various parts of the building

The captured water from the rain water harvest system will be reused to water urban greenery and flush toilets. Pipes will need to be installed and laid out throughout the building. A water tank will need to be installed in the basement with a pump that pumps the water back up to the various levels in the building. The pumped water can then be used to flush the toilets around the building.

Master Breadth: Daylight delivery system for Tisch Lobby

The Tisch Hall lobby façade can be developed to incorporate an efficient daylight delivery system to provide high quality daylighting to the building interior. Daylight can provide a positive psychological effect on the occupants. Studies such as the daylight pattern will be analyzed throughout the year. Various daylighting techniques such as light shelves and overhangs will be evaluated to provide the best solution to deliver quality daylight system.