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[ELECTRICAL PROPOSAL]

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Lighting/Electrical Option
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Summary

This document contains proposal material to be submitted for second semester electrical work approval. Mechanical system redesign is governing most of the changes that will be made to the power system of the Millennium Science Complex. The requirements being addressed are as follows:

1. Two to three spaces to be redesigned for lighting and circuiting
    a. Student Study Area
    b. Distinguished Office
    c. Cantilever Courtyard or Laboratory Space
2. Short circuit hand calculation equipment
3. Two depth topics
    a. SKM building model
    b. Motor Control Center design

Lighting Redesign Spaces

Student Study Area – perimeter of each wing

The current lighting design is recessed linear fluorescent luminaires wired to a continuous dimming system. I propose to change the system to pendant-mounted indirect-direct fixtures while switching the direct component with the use of a photosensor.

Distinguished Office – perimeter of each wing

The current lighting design consists of recessed linear fluorescent luminaires switched by occupancy sensor. I propose to integrate downlighting with chilled beams as specified by my mechanical engineer and match aesthetics with additional recessed linear fluorescent downlights. Additionally, some of the peripheral wall emphasis will utilize wall slot washing fixtures.

Option 3a – Cantilever Courtyard

The current lighting design is achieved by metal halide luminaires mounted in the underside of the cantilever to flood the courtyard area with bollards throughout the path below. Should KGB Maser decide that a structural redesign is possible in this area, the design would be changed to a combination of LED and halogen sources to light the sidewalks and flood the underside of the cantilever.

Option 3b – Lab Space within the core of a wing

If the cantilever redesign is deemed unfeasible, then the third lighting design may be focused on a lab space. These currently use linear fluorescent 2'x4' troffers. The redesign will most likely utilize pendant-mounted indirect-direct linear fluorescent fixtures with the addition of task lighting at desk spaces.

Short Circuit Analysis

The short circuit hand calculation will be completed by each of the three IPD/BIM students together. The analysis will begin with the utility from campus and include the following path:

1. Penn State Utility service entrance
2. Main Distribution Panel MDS-01B
3. Transformer TRN-SDP-2D1
4. Distribution Panel SDP-2D1
5. UPS 3D-1/2
6. Feed-through panels LB-3D1/2

Depth Topic 1 – SKM Analysis

This depth topic stems from mechanical changes that will be made to the Millennium Science Complex by KGB Maser's mechanical engineer. We will be changing from an all-air system to a combination of air handling and chilled beams. This will drastically change the amount and size of motors in the system. With those changes in mind, two SKM models will be made – one existing and one with reaction to mechanical system changes. The beginning of the semester will consist of modeling the existing power system and the second semester will include changes to the system and automatic sizing of equipment by SKM. The two scenarios will be examined side-by-side to compare equipment size and thus cost changes to the system. The system will be limited to the path from utility source to the equipment that serves the third floor of the building.

Depth Topic 2 – Motor Control Center Addition

As stated in depth topic 1, the mechanical system changes will cause changes in size and requirements for the electrical system. With smaller and less air handling units, I will examine the effective ness of consolidating what equipment is left in the penthouse to a motor control center. This may eliminate the uses of extra panels and provide one location for mechanical equipment control. The SKM analysis from depth topic 1 and information in the EATON® Power Systems Consulting Application Guide, the GE® BuyLog, and SquareD® online catalogs will help size the control center and price the equipment. Once sized and designed, the MCC will be located in the mechanical penthouse with input from the structural engineer for clash avoidance.