Electrical Proposal for Spring 2011

Susquehanna Center Renovations & Expansion

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Electrical Depth

The Susquehanna Center's electrical system is a radial system with on point designated for a service entrance in the northwest corner of the building. The service provider is Baltimore Gas and Electric (BGE), and the building receives the power through a pad mounted transformer. Since the building has been constructed and filled for a service permit, the pad mounted transformer has not been sized. The building contains two types of voltage systems and those are 480Y/277V, 3PH and 208Y/120V, 3PH and a 3200A main switchboard provides power to all equipment loads.

The depth of the electrical portion of senior thesis is to re-design the branch circuiting for the four spaces being re-designed, a hand calculated short circuit analysis and protective device coordination, and two depth topics. The two depth topics that are most relevant to my building are the system analysis using SKM software and provide a motor control center for major mechanical equipment.

Branch Circuit

The four spaces that will be re-designed for branch circuiting will be the same four spaces that I chose to re-design the existing lighting systems. Those spaces are the exterior building façade, lobby, auxiliary gymnasium, and weight and fitness room. A brief description of the existing and proposed lighting systems will be provided for each space.

- **Exterior Façade**

The exterior façade's existing lighting design only contains compact fluorescent down-lights in the canopy over top of the sidewalk along the building façade. The proposed lighting design will include LED fixtures to graze architectural shading device and the roof of the main arena. Other fixtures types include metal halide, which will be used to graze the brick of the building façade.

- **Lobby**

The lobby contains the same fixture types located in the canopy located on the exterior of the building, except that the lamp type is a 100 watt metal halide. The proposed lighting design will utilize dimmable LED fixtures in the ceiling and linear fluorescent fixture types to wash display cases, and honorary plaques.

- **Auxiliary Gymnasium**

The existing design of the auxiliary gymnasium uses 250 watt metal halide high bay fixtures. The proposed lighting design will introduce daylighting systems in the space via skylights and will be integrated with linear fluorescent high bay fixtures capable of being

dimmed. A photo-sensor will coordinate the integration between the electric light and daylight conditions.

- **Weight and Fitness Room**

This space is a unique space in that the ceiling height changes three times from 8'-0" to 9'-0" to finally 15'-0". In each step a different fixture type is used in the existing design. Standard compact fluorescent down-lights are used in the low ceiling then fluorescent troffers, and finally linear fluorescent direct/indirect pendants. The re-design will encompass the same fixture types but in a different manner. Linear fluorescent fixtures will be used for cove lighting in the 9'-0" ceiling instead.

Protective Device Coordination Study and Short Circuit Analysis

For a single path within my electrical distribution system, a protective device coordination study will be conducted. The path will extend from the utility transformer to the main switchboard to panel MLP. The coordination of protective devices for the re-designed system components along this path will be provided and short circuit calculations by hand will also be included.

System Analysis Using SKM Software

An evaluation of the entire electrical distribution system will be conducted using the SKM software. It is important that the building electrical system ensure the economic feasibility and safety of the system. SKM will perform a short circuit analysis, protective device coordination, and arc fault study for the entire distribution system. This evaluation will demonstrate the system's ability to perform as per specifications and sufficiently supply the loads.

Motor Control Center

On the northwest corner of the building, where the service entrance enters the building there are two rooms that serve to provide space for major mechanical equipment. Also, in this corner of the building is the main electric room, where the service entrance enters the building and supplies panel MLP. This panel serves all the major mechanical loads, but the starters of each piece of mechanical equipment are located at the device. Since, the room are adjacent then I am proposing to provide a motor control center that will centralize all disconnects and starters for the major mechanical equipment in this area.