Appendix A | Technical Analysis Studies

A brief summary defining the technical analyses incorporated within my thesis can be found on the following page.

Introduction

The following topics involve a more detailed analysis of the technical options within the major. In addition, both topics stem from the previously mentioned analysis entitled Building Integrated Solar Energy Systems.

Technical Analysis #1

Structural

Currently, the roof of the building is a 296,000 SF flat roof comprised of a TPO membrane applied to a 3" concrete topping slab on precast double tees. On one portion of the roof, there is a mezzanine level housing (32) engine-generators, approximately 19 tons each, resting on a 6" slab, therefore the roof structure can withstand a great structural load.

As mentioned in the Building Integrated Solar Energy System analysis, I intend to place a large solar array on the roof. The technical analysis will involve determining the effect this array would have on the existing structural system and compare it to the maximum load allowed. If the maximum load is exceeded then I will need to devise a way to further support the roof, such as increased reinforcement, thicker concrete slab, and/or change in the column stress, etc.

Technical Analysis #2

Electrical

For ACC5, utility power will service the data center in two locations each at 34.5kV. That power will then be stepped down to 600V via pad-mounted transformers and fed to the system's UPS. Another step down will occur transforming the power from 600V to 180/208V AC for computer room distribution. Had DC power distribution been utilized, a 600V AC power to DC power conversion would have occurred at this point in addition to the 600V to 180/208 AC step down.

By implementing a solar energy system into the existing electrical system, I would need to determine the effect that the energy generated from the solar power would have on the existing system. I intend to analyze a means of tying together the two systems. Upon researching DC power distribution, if it seems like a more logical design, then I will need to determine a way to convert the utility power to DC power and how to distribute that power throughout the building. This analysis would also involve evaluating the cost effects and constructability of a solar energy system.