

CHRISTOPHER R. STULTZ | CONSTRUCTION MANAGEMENT

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PROJECT | CRYSTAL PLAZA II

LOCATION | ARLINGTON VA

DATE | 1/20/09

THESIS PROPOSAL | REVISED EXECUTIVE SUMMARY

## Executive Summary

This document serves as a proposal for thesis research to be conducted during the spring. The requirements include the need for a minimal two topics of breadth study, a study of a critical industry issue, and connections to graduate level course work. The following topics have been identified as potential areas of research after review of constructability, value engineering, scheduling, and discussions with the construction team. While each analysis is different, there is an underlying theme throughout the proposal of value adding sustainability to Crystal Plaza II. The topics are listed below with descriptions of requirements met and a brief overview of the intended research.

### **Analysis 1: Building Integrated Solar Energy Systems & DC Distribution**

*(MAE-Alternate Power Sources, Sustainability; Breadth- Electrical)*

The first analysis focuses on the rising cost of energy in the United States and a potential way for the owner to supplement these costs. The use of a building integrated solar energy system can provide energy for use within the building or to sell back to the local utility. Recent research has indicated that even non-optimal surfaces can still produce a substantial amount of energy to offset the cost of placing the PV material at a less the favorable location. Also of concern is the distribution and use of this energy. PV's produce their energy as direct current, DC, while nearly all building equipment utilizes AC, or alternating current. The need for an efficient DC distribution system will be evaluated as part of this analysis.

### **Analysis 2: Peak Demand Shift & Demand Response Programs**

*(Breadth- Mechanical/Electrical; Critical Industry Issue)*

This analysis focuses again on the rising cost of energy, but as a critical industry issue in providing alternative uses for equipment to help lower energy costs. This analysis is not focused on energy savings, but on energy cost savings. The research and review of demand response programs, as well as the use of emergency energy generation equipment will be evaluated as ways to shift the building's energy demand spike and sell unused energy back to the utility. Additional research into combined heat and power will also be included, but not as the primary focus, as the emergency energy generation equipment has already been installed.

### **Analysis 3: Financing Projects through Energy Savings**

*(Critical Industry Issue)*

The third analysis begins to look at the overall effect of the first two analyses and the results of saving energy. As the economy begins to face tough times, contractors will be forced to work more in a renovation type environment that deals with saving operating costs. This analysis will look into the current availability of energy programs, whether it be direct financial savings or through marketability of energy. Also, as part of this analysis an industry overview will be provided through the use of a survey of current industry members.

### **Analysis 4: Consolidation of Slab Penetrations**

*(MAE- Virtual Prototype/Modeling; Breadth- Mechanical, Structural)*

The final analysis area will concentrate on the consolidation of mechanical and plumbing risers to lower the number of required slab penetrations. This has a direct effect on budget and schedule as costly structural reinforcement is required to meet the proper structural design loads. The process for structural reinforcement is costly, time consuming, and area intensive. By eliminating the need for some of the many penetrations and evaluating key areas, the structural reinforcement may not be necessary, in effect accelerating the schedule and saving the owner money.