Executive Summary

The following document is a comprehensive analysis that focuses on current industry issues and construction methods involving the construction of the Mid-Atlantic Data Center 5 (MADC5) located in Ashburn, Virginia. There are four main topics of discussion with a construction management emphasis in each topic. Included are project background information, a critical industry issue, an analysis of a building construction process, and two analyses of energy efficient building design practices.

The critical industry issue investigates the current economy's affect on the construction industry with an emphasis on the status of MADC5. Research reveals that construction projects are struggling to secure loans to begin and continue construction, therefore projects are forced to postpone until further notice or shutdown completely. After analyzing the owner's construction expenditures, construction schedule, and existing revenue, a project execution plan was developed that ultimately provides a 6 month shorter construction schedule and $33,251,400 of additional revenue while remaining above the suspension point.

The first analysis takes a look into the concrete construction process with a focus on reducing the amount of time that the concrete subcontractor is on-site by utilizing an alternative slab design. This evaluation compares a continuous slab-on-grade in lieu of the existing slab-on-grade with trenches and the effects on subsequent trades. The results show that the continuous slab-on-grade is easier to construct, quicker by 15 days, and saves the owner $1,170,828.

The remaining two technical analyses concentrate on energy efficiency savings pertaining to the electrical and mechanical systems and their impacts on construction costs, schedule, and environment. The first analysis looks at the electrical and energy impacts of a thin-film photovoltaic system utilized to power the building lighting load. This investigation reveals that installing the thin-film PV system would produce a yearly energy cost savings of $46,770, has no impact on the overall construction schedule, and prevents 962,914 lbs. of CO_2 from entering the atmosphere. The second analysis evaluates the mechanical and energy impacts of implementing water-side economizers. Results show that the water-side economizers produce a yearly energy costs savings of $182,472, have no impact on the overall construction schedule, and prevent the emissions of 4,704 lbs. of CO_2.