

Executive Summary

Throughout the 2013/2014 academic year, this Campus Project was analyzed and researched in an effort to identify areas that could benefit from an alternative solution, primarily in construction. Through interviews and independent research, four major items were chosen for additional analysis. The purpose of this thesis and the analyses performed were completed for educational purposes only. The conclusions are not meant to critique the performance of the project team in any way.

Analysis I: Structural Redesign

The first analysis sought to take advantage of the high prevalence of cast-in-place (CIP) concrete structures on site. Only two of the five buildings were built with a predominantly steel structure. These buildings, the Fellowship Hall and Convent/Monastery, were redesigned with a CIP concrete structure. The goal of this change was to take advantage of worker affinity to CIP concrete, and create a consistent structural element across the project. Following the redesign, the structures were examined to determine how the change would affect the schedule and cost of the project. For the Fellowship Hall, the cost and schedule were both increased by \$2,005 and 80 days respectively. Similarly, the Convent/Monastery experienced increases by \$252,129 and 945 days.

Analysis II: Restructure of Concrete Bid Package

Further research was conducted into the size and scope of the concrete bid package for the project. CIP concrete was the most used structural element, constituting a significant portion of the total cost. Furthermore, a number of complex shapes and designs, primarily on the Mosque and Turkish Bath, required complex form for CIP construction. This placed significant pressure on the subcontractor in charge of the concrete scope, particularly since nearly all of their work would critically affect the schedule. This analysis sought to divide the concrete scope into smaller bid packages that could be awarded to multiple subcontractors, reducing the pressure and allowing them to focus on their construction efforts. The analysis results recommended a two bid package division which was awarded to two selected local subcontractors. This division will require careful coordination and some contractual language modifications, but it will also give the subcontractors more opportunity to plan for the challenging work they will complete.

Analysis III: Workforce Management Plan

As a multi-building project, construction of this Campus Project presented a unique opportunity to employ a larger workforce resulting in higher productivity. Construction operations could occur in several different locations, particularly coordinated by building. Unfortunately, the larger site caused additional challenges in terms of tracking and managing the workforce. Through this analysis, a Workforce Management Plan was developed to give the project team tools to track, analyze, and

manage site work. Scheduling methods, such as Last Planner and Pull Planning, were explored as methods of coordinating work, identifying problem areas, and improving productivity. Additionally, tips for managing the foreign workforce on the project were provided based upon research conducted into their culture and typical working practices.

Analysis IV: Foreign Worker Safety Plan

As part of the cultural design aspects of the project, a significant number of foreign artisans will be brought to the project from their home country in order to construct many of the architectural finishes. Due to differences in culture, language, and work practice, this will create a safety risk for the workers on site. With a potentially limited knowledge of English and US construction regulations, the foreign workers could inadvertently place themselves, and others, in dangerous situations. Case studies, journals, and other articles were examined to gain an understanding of the safety principles that can be employed on a construction site. Using this information, a Foreign Worker Safety Plan was developed with general and site specific recommendations. The plan focused on several major areas of concern and provides detailed recommendations of how to improve safety.