

Executive Summary

Over the fall 2013 and spring 2014 academic year, the HUB Renovations and Addition Project of The Pennsylvania State University was analyzed in order to identify areas that had potential to enhance the project overall. Through countless hours of research, feedback from academic members, the project team, multiple site visits, and construction professionals, four main areas were focused on for further analysis. The following report presents the four analyses performed as part of The Pennsylvania State University Architectural Engineering Senior Capstone Project. The purpose of this thesis project is strictly educational and is not intended to critique the work performed by the project team in any way.

Analysis # 1: Schedule Resequencing

The first analysis addressed the feasibility of resequencing the interior bookstore phase of the original schedule. Analyzing the schedule by decreasing unnecessary float, sequencing improvements, and schedule overlap the schedule was looked to be improved. Areas of the project were looked at in order to accelerate the schedule which later analyses touch on. In addition, the lean principle of Last Planner was investigated for implementation on a project such as the HUB. The project team is encouraged to use the suggested acceleration techniques as well as the idea of Last Planner to make up for schedule delay.

Analysis # 2: Terra Cotta Rain Screen Redesign

Nearly half of the renovations and addition on the HUB façade is comprised of a complex terra cotta rain screen. This analysis addresses the need for schedule acceleration by providing an alternative brick veneer design. By switching the rain screen to brick veneer the project was able to save over a week of work days on the exterior façade of the bookstore alone, while saving \$64,143.18. With similar thermal properties analysis and acceptable structural loading, the project team is encouraged to use the alternative design to provide schedule and cost savings.

Analysis # 3: GPS Material Tracking System – Structural Steel

Topics discussed during The 22nd Annual PACE Roundtable by construction professionals led to the research portion provided in the third analysis. With a Just-In-Time delivery system for the structural steel a GPS tag tracking system will help ensure quality control by preventing schedule delays. The cost of the tracking system is roughly \$88,150 and the schedule would not see any savings. Although the technology to track the steel pieces will promote quality control, implementation would not benefit the project team due to the cost impact on a project of this size.

Analysis # 4: Removal of Habitable Green Roof Design

The final analysis looks at the current design of the habitable green roof to be constructed on the existing bookstore roof. Providing an alternative cool roof design will further address the need for schedule acceleration due to unforeseen issues. The alternative design provides a cost savings of \$154,896.00 and a schedule savings of 40 work days. The project team is encouraged to use the alternative design due to the cost and schedule savings of switching the design of an already existing roof structure.