

Executive Summary

The purpose of this report is to present and discuss four different analyses based on various aspects of pre-construction planning. These aspects include Schedule Development, Identification of Prefabrication Opportunities, Building Information Modeling (BIM) Execution and Planning, and Subcontractor Procurement.

The first analysis involves developing two resequenced schedules – one focusing on erecting the new stairwells before demolishing the existing stairs and the other focusing on accelerating the construction of the elevator – and comparing them with the original schedule. The two schedules were built based off of major project milestones like move-out or dry-in. Once these schedules were built, they were analyzed based on their cost differences with the original schedule. The resequenced stairwells schedule cost approximately an extra \$12,300 to remobilize some of the crews, whereas the original schedule cost \$17,400 to rent to scaffolding stair towers. The accelerated elevator schedule required the use of a freight-sized elevator that would cost about \$297,000, whereas the designed elevator in the original schedule only cost \$264,000.

The second analysis investigates the possibility of prefabricating the façade on the south side of the central wing instead of using limestone courses. Among the various designs and materials investigated, a bisected precast concrete column design was selected. The design was then checked for structural integrity and thermal and moisture performance before the unit costs between the proposed design and the existing design were compared. The precast concrete columns passed the structural, thermal and moisture checks. However, it costs \$37.85 per square foot to build while the original limestone façade only costs \$33.32 per square foot to build.

The third analysis evaluates the project team’s current usage of BIM, specifically their usage of 3D Coordination. The goal was to identify the issues that resulted in an excessive number of model clashes at bid and to propose a change to the BIM Process Design that would assist in preventing or mitigating the issues. To do this, members of the project team were interviewed to gauge where the issues came about. Then, two project managers who worked on BIM-integrated projects at Penn State were interviewed to see what could have been done better. Based on these interviews, the underlying issue was concluded to be a breakdown in communication. Thus a Level 2 process design was created to improve communication and generate more support for the team.

The fourth Analysis is an Industry Research Topic that looks at forming a Best-Value procurement criteria list for Penn State’s Office of Physical Plant to use when selecting subcontractors. This list was created based off of the feedback from OPP’s project managers and coordinators via a questionnaire about Best-Value selection. While almost everything was considered “valuable,” the top performers were Personnel, Team Chemistry, Safety Record, Past Experience, QA/QC Program, Schedule, Reputation, Cost, and BIM Experience.