

EXECUTIVE SUMMARY

The Senior Thesis Final Report displays the research and findings of four analyses that were performed on the Metro Museum of American Art (MMAA) project. The MMAA is a new construction building that is being built in order to house the expanding galleries of the MMAA. It is a \$266M job that has a construction schedule of approximately 37 months. The building is 222,952 GSF large which gives a cost per square foot of approximately \$1,200. The goals of these analyses are to expedite the interior fit out schedule so that the risk associated with this phase can be mitigated.

Analysis 1A: Gallery Ceiling Prefabrication

The first analysis focused on the gallery ceilings due to the long schedule lengths associated with them. The MMAA has five galleries throughout the building that take on average 416 working days to completely fit-out; with 100 of these days devoted to the installation of the gallery ceiling system. In order to cut down on this installation time the fifth through seventh floor galleries were prefabricated off site and transported to the site ready to be installed. This analysis resulted in a five week reduction of the project schedule and an estimated \$346K in savings.

Analysis 1B: Gallery Ceiling Redesign

This analysis also focused on the gallery ceiling due to their long schedule length. Instead of prefabricating the ceiling, this analysis looked to completely redesign the ceiling system in order to facilitate simpler construction methods. The redesign saw the complex network of steel component that originally defined the ceiling system get replaced with suspended ceilings that include acoustical panels, open cell grid, and exposed structure. This analysis would ultimately save five weeks of schedule time and an estimated \$1.18M. Note that this analysis includes architectural and acoustic breadths.

Analysis 2: Gallery SIPS Implementation

The second analysis looked to implement a SIPS schedule on the project. This analysis was used in order to speed up the lengthy gallery fit out schedule. Activities were originally scheduled start to finish with each trade occupying an entire gallery. By dividing up the galleries into zones and adjusting the workforce productivity the SIPS turned out to be very successful; it shortened the project schedule by 5 weeks and saved the project an estimated \$497K.

Analysis 3: Critical Industry Issue: Union Division of Labor

The third analysis focused on the critical industry issue of the union division of labor when utilizing a prefabrication process. The main issue associated with the union division of labor is determining who gets to lift the completed modules into place because there are multiple trades of work complete on the modules. In the MMAA case the iron workers would be the ones to lift the modules into place because their work defines the structure of the ceiling system and their work connects the modules to the structural steel above. The other trades would be allowed one representative to be present during the installation to ensure that their work is not damaged during the hoisting process.

Analysis 4: Extending the Use of BIM on the Project

The fourth analysis focused on expanding the BIM use on the project. The MMAA is already using BIM for 3D coordination and clash detection. However, there are many new applications of BIM that could be implemented on the MMAA successfully that would provide value to the project. This analysis used the *BIM Project Execution Planning Guide Version 2.1* that was researched and developed by the Computer Integrated Construction Research Program at the Pennsylvania State University in order to identify 4D modeling and site utilization planning as potential BIM uses that would be beneficial to the MMAA. A project execution plan was also developed for the MMAA.