

Executive Summary

This final report discusses three separate analyses performed on the Butler Health System New Inpatient Tower project. This project includes a 210,000 Square Foot addition to the existing Butler Memorial Hospital. In addition to this, there is also minor renovation work of the existing hospital. This thesis is based on the application of three revolutionizing industry technologies into this state-of-the-art hospital. The analyses topics included the application of a photovoltaic array, prefabrication of overhead MEP systems, and the application of additional BIM uses.

Analysis #1: Feasibility Study and Design for Photovoltaic Array Application

With the rising cost of energy, the idea of sustainability is becoming a growing concern in the construction industry. Although this project is a high-tech facility, the concept of sustainability was not addressed to a significant extent. This study involves installing a photovoltaic solar array on two separate roofs of this building. The array was determined to have a payback period of 2-years and a 25-year value of nearly \$750,000. With the incentives provided by the government, it has been determined that this would be a logical investment for the owner.

Analysis #2: Implementing the Use of Prefabricated MEP Spaces

Efficiency and productivity are two terms that are consistently touched upon in the industry. With smaller margins and less profit available, contractors and owners continually seek for ways to improve the timeliness of the project. Because healthcare projects are infamous for complex MEP systems, this analysis deals with the concept of prefabricating of the overhead corridor spaces. This analysis resulted in doubling the productivity of the MEP subcontractors and a total project savings of nearly \$1 million. These results prove that this concept would greatly benefit the entire project team.

Analysis #3: Analysis for the Potential Addition of Building Information Modeling Uses

The use of Building Information Modeling (BIM) is becoming a staple in the construction industry. With the idea of improving the project for the entire lifecycle of the building, BIM is seen as a staple. For this construction project, BIM was only utilized for 3D coordination and 4D modeling. The BIM Execution Guide and multiple case studies have been used to determine more optimal ways that BIM can be applied to the project. Through this analysis, several more BIM uses are determined to be beneficial. In particular, the idea of virtual mock-ups appears to be the most advantageous application. This analysis included the production of a virtual mock-up by using the game engine, Unity.