Executive Summary

This report contains a comprehensive analysis of critical industry issues and the design and construction of the Detroit Integrated Transportation Campus (DITC). A project overview of the DITC is followed by three areas of analysis. A construction management emphasis will be the main focus of analysis for each area.

The depth analysis of this report explores the critical industry issue of inadequate interoperability in the capital facilities industry, and specifically the inadequate interoperability due to a lack of planning for the execution of Building Information Modeling (BIM) on facilities projects. This research falls under an effort by the Computer Integrated Construction Group to develop a BIM Execution Planning Guide, which will aid the creation of a BIM execution plan in the early stages of a project, and is intended for facility owners, designers, contractors, subcontractors and manufacturers. This research looks at the development of a generic process map for 4D modeling, and applies the generic map to develop specific process maps for utilizing 4D modeling on the DITC project. Also, a Model Progression Requirements document was developed to aid project participants in planning the development of a model for different BIM uses throughout a project's lifetime. The Model Progression Requirement was applied to the DITC project, and completed for three different BIM uses. It is recommended that the DITC project uses the model created in design to aid in the construction of the building. Ultimately, it is recommended that the facilities industry should increase the use of 4D modeling, utilize process maps to plan for BIM uses, and document the planned progression of building information models for projects that have multiple BIM uses.

The DITC was originally planned to start construction in October, 2008; however, due to complications with the general contractor bid process, the construction has yet to begin as of March, 2009. In order to increase the speed of construction on the DITC, and help the project finish before the planned one year construction period, prefabrication of building systems was analyzed for the DITC.

One analysis looks into replacing the typical brick on metal stud façade of the DITC with precast brick panels. The assessment of this analysis revealed that precast brick panels would increase the project's cost by $ 10,613, decrease the building's annual operation costs by $453, and decrease the overall project schedule by 3 construction days.

The other prefabrication analysis looks into replacing the typical drywall on metal stud interior walls of the DITC with a modular wall system. The assessment of this analysis reveals that a modular wall system would add to the sustainability and flexibility of the interior spaces, increase the project cost by $48,628.71, and decreases the project schedule by 6 days. Assuming a 10% per year move rate, the upfront increase in cost for the modular wall system could be recovered in a 60 month payback period due to tax and renovation savings.

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