

6 - Summary & Conclusions

Designing the Design Model (With a Focus on 4D Modeling)

As an effort to implement the industry wide adoption of Building Information Modeling (BIM), through open interoperability and full facility project lifecycle, the AEC industry should utilize process mapping and model progression documentation to develop BIM Execution Plans on both a company and project level. Process maps and model progression documents could be created on a company level to better define company specific BIM processes, while also created on a project level to define project specific BIM processes. Ideally, BIM participants on a project would combine their company process maps and model progression documents to create project specific documents.

The lack of “whole project” 4D modeling can be related to the slow acceptance of BIM and the lack of defined levels of scheduling within the construction industry. By defining levels of scheduling and relating those levels to the creation of multiple 4D models, the construction industry would not only benefit from improved planning, scheduling and project control, but could also benefit from improved communication on projects.

The Detroit Integrated Transportation Campus (DITC) has yet to begin construction, and the project has no plan of passing the model to contractor to be utilized for construction. This process would fall under the inadequate interoperability in the U.S. capital facilities industry, as defined by the National Institute of Standards and Technology study. Therefore, the model should be passed on, with a “no-liability” clause, for the contractor to use as they please. As it is a Design-Bid-Build delivery, the contractor selected may have no BIM experience; however, no matter the experience level, the contractor should attempt to use the model in construction.

Prefab with Precast Brick Panels

Due to delay of the construction of the DITC, the project’s completion date is continuously being pushed back. In order to increase the speed of construction, and decrease the overall project schedule, the project participants should look into the prefabrication of building systems. One prefabrication possibility is replacing the typical brick on metal stud façade of the DITC with precast brick panels. After a comprehensive analysis it was determined that National Precast’s 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. From a construction management viewpoint it is recommended that the DITC substitute the precast brick panels for the brick on metal stud. The upfront cost increase of the precast panels could be recovered in 23 years due to the annual heating and cooling cost savings. Even though the overall construction schedule is only decreased by 3 days, eliminating the brick on metal stud removes any delays that are possible with masonry construction. Eliminating the masonry construction also gives way to a less congested site, as the scaffolding required for masonry would congest the southwest corner of the building, which is already tight to the street.

Modularization of Interior Walls

Another prefabrication possibility is replacing the typical drywall on metal stud interior walls of the DITC with a modular wall system. After a comprehensive analysis it was determined 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 the tax and renovation savings. Therefore, it is recommended that the IrisWall system be substituted on the DITC, and the furniture system redesigned to be more flexible. The State of Michigan stated it would stay with the original design for the DITC; however, they are implementing a modular wall system on a current construction project, and will look into the idea for future projects.