

Modeling Temporary Components in a BIM Environment

Ebrahim P. Karan and Javier Irizarry, Ph.D., PE

Georgia Institute of Technology
Atlanta, Georgia

The use of building information modeling (BIM) through the lifecycle of a building has increased rapidly in recent years, which has shifted the emphasis from drawing to modeling. While initially used for the design phases of a project, it is now being utilized through the construction phase for a wide range of applications such as 4D simulation, providing accurate quantities and clash detection. Despite these successful applications, the use of BIM for pre-construction planning has not gained wide acceptance as in other phases of the project. Many of the pre-construction activities (e.g. site layout planning) do not fully take advantage of the benefits BIM provides to the design and construction practice. One of the major reasons for this problem is the lack of semantic and spatial information regarding temporary structures and topographic objects, which makes it difficult to visualize and represent their geometric properties and spatial relationships in a BIM environment. While most BIM tools are designed to handle large number of permanent building objects, this study aims to automate the integration of site terrain and temporary structures together with permanent building objects into one building information model. BIM design tools do not support raster-based terrain models that contain regular grid cells and elevation values assigned to each cell. Geographic information system (GIS) is utilized to extract and manipulate data regarding topographic and existing conditions of building site terrain; therefore, location and elevation information can integrate with the building's orientation in the site. GIS can also be used to assign a location to the temporary structures. The task of locating a particular temporary structure requires a great amount of spatial data that cannot be modeled with BIM. To overcome the lack of geospatial analysis, this study investigates the integration of BIM with GIS for defining parametric relationships between the temporary components (e.g. terrain surface, temporary buildings) and their data attribute. In order to define the properties of temporary components, different parameters are defined and used to control the visibility of each component in BIM and to extract all necessary geographic information in GIS.

Key Words: BIM, GIS, Site Terrain, Temporary Structures