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At the last Canadian Design Build Institutes annual meeting in Chicago, IL there were several presentations and various discussions around the growing use and of Building Information Modeling (aka BIM). There are many issues which any design build firm (be it the designer or the constructor) needs to educate themselves before integrating BIM into their operations. BIM has many advantages, but there are also many risks which your firm may need to address. We hope this introductory article written by a member of the CDBI Risk Management Committee will assist in your review, understanding and future considerations of BIM.

The Risk Management Committee of the Canadian Design Build Institute will continue to circulate articles of this nature to members as they become available. We trust this will be found to be of interest and beneficial to the members.

Important "BIM-formation"

by Paul Stocco Partner, Brownlee LLP

Technology has had a tremendous impact on construction. Each new technological advance in construction machinery and construction products influences how a construction project will look once completed. Along with changes to how construction projects are built has come a change in how construction projects are designed. Building Information Modeling (BIM) promises to revolutionize the way construction projects are conceptualized, designed, constructed and ultimately operated/maintained. This new and exciting design model has many advantages, but as with any innovation, there are risks.

BIM has been described as follows:

> "***Building Information Modeling (BIM)*** *refers to the creation and coordinated use of a collection of digital information about a building project. The information can include cost, schedule, fabrication, maintenance, energy, and 3D models. The information is used for design decision-making, production of high-quality construction documents, predicting performance, cost estimating, and construction planning, and eventually, for managing and operating the facility.*"

In other words, BIM is a design tool that blends computer assisted design/drafting (CAD) with an information database about a building or a component part of that building. For example, when a designer uses CAD, the designer can produce a traditional 2D set of blue prints as well as a 3D computer model of the building. By using BIM, the designer can "embed" into the 3D model detailed information about various components that go into making up the building. Put another way, with BIM, the design phase for any construction project is more about assembling components that have embedded information about themselves and their relationship to other parts of the structure than it is about drawing the lines which show views of the building. This is the reason why these data-rich components are often referred to as "intelligent objects".

The “intelligence” in these objects allows the various objects to “talk to each other” during the design phase. As can be seen from the following example, this can be quite beneficial. For example, if a change is made to a wall section of a building structure during the traditional design process, the designer must re-design all components in that wall section so that they “fit” into the new wall design. Existing plumbing, electrical and structural systems may have to be re-designed in order to accommodate the change. In other words, the designer must ensure that the change does not result in a problem with constructability of the re-designed wall section and that all the remaining components in the wall system mesh perfectly.

By contrast, in a BIM design process, the designer selects a pre-programmed object (e.g., a window or a structural beam) accompanied by embedded information and relevant characteristics, and the designer inserts the new “intelligent object” into the wall section. The new intelligent object “talks” to the other existing components in the wall section in order to make sure that there are no conflicts or clashes. If adjustments to the wall section or other components within the wall are required, the BIM software makes those adjustments instantly and seamlessly.

This ability of BIM to avoid clashes in the field helps eliminate inefficiencies in design that can lead to costly change orders for an owner. Research suggests that almost 1/3 of all money spent annually on infrastructure is actually spent on construction inefficiencies and delays[1]. The same research suggests that the use of BIM can lead to tremendous cost savings in these areas. BIM also allows a designer to load schedule and cost information into the software; therefore, the impact of any given design change can be seen not only on the traditional 2D drawings, and on the 3D computer model, but the impact of the change can also be seen on the construction schedule and project cost. There are many other “BIM benefits” for an owner. For example, BIM produces better informed decisions regarding specifications and costs during the design stage, which in turn helps eliminate unbudgeted extras in the field. BIM also produces better scheduling of trades and materials that helps eliminate construction delays and helps achieve targeted completion dates. BIM also generates more accurate as-built drawings that are necessary for future operation of the completed building. Because BIM software allows objects to “talk” to each other, this is of considerable benefit to an owner when operating and maintaining a building as the interconnection of product specifications, product life cycle and costs can all be loaded into one BIM data base.

However, with new technology, there can be risks. Firstly, there is rarely a single “BIM model”. Rather, there are separate models created for their respective purposes by each project participant. These independent models can be “mined” for information by other participants, who can then take that information and use it in their own model. The obvious challenge is ensuring that these various BIM models are able to communicate with each other.

Secondly, the risk of BIM generally lies in the fact that it is outpacing the traditional legal, insurance and business structures of the construction industry. There is no standardized and generally accepted BIM contract language, and there is no caselaw where BIM has been considered. BIM is built on an assumption of reliable electronic information that is to be shared, but the traditional approach in the construction industry has been that reliance on “shared information” is customarily disclaimed. BIM is a foundation for collaboration among the project participants in an industry that is traditionally built on an adversarial structure and behavior.

[1]Holtby, Denise, “BIM offers benefits to all participants in construction process.” *Journal of Commerce,* March 3, 2008.

Thirdly, the ability of the various software packages to "talk" to each other and share information is critical to the effectiveness of BIM. However, this desired degree of "interoperability" does not exist in the software world. Furthermore, there are issues of the ability of various software packages to translate data from different software and then send it back in a non-corrupted format.

Fourthly, given the underlying collaboration and sharing of data that is required to make BIM effective, there is always a danger that the project participants may confuse or ignore their traditional responsibilities. For example, designers could become involved in dealing with a contractor's "means and methods" for constructing the project and a contractor may become involved in design issues. This presents liability issues that the construction industry and the insurance industry have yet to resolve.

Lastly, a host of other issues must be addressed, namely: who owns the data and are there copyright issues; who will be responsible for "hosting" the virtual location where the data will be shared; where will the data be stored and who can access it should the need arise.

BIM is emerging as a new way to design, and manage a building project. The benefits of employing BIM on a construction project are clear. However, there are risks with adopting this new approach. Careful consideration must be given to technological, contractual, and insurance issues that arise. Owners would be well advised to thoroughly examine whether their project is an appropriate one for this new approach.

Paul V. Stocco is a partner and the head of the Construction Law Team for the Alberta based law firm of Brownlee LLP. Paul's practice involves providing advice to his clients on issues relating to all aspects of construction contracts including design-build and P3s, and construction procurements involving tenders and RFPs. Paul also represents clients involved in construction litigation at all levels of Courts. Paul is the editor of Brownlee LLP's ***Constructive Thinking*** newsletter and is a member of the Law Society of Alberta and the Law Society of Upper Canada (Ontario). The Construction Law Team at Brownlee LLP practices in conjunction with a number of lawyers at the firm whose practice includes Municipal Litigation and Corporate Commercial Litigation.