BIM innovation Awards 2016

Stewart Building Contractors Submission
Introduction

Stewart’s application of BIM on the following projects illustrates the time and effort that has been invested in this relatively new way of thinking in the construction industry. The idea of BIM has been around for decades, but it’s only in the last number of years that we have been advantageous enough to have technology capable of delivery BIM and methodologies in place on construction sites to carry it out successfully. Stewart has embraced BIM, as we saw the potential returns from the correct implementation of BIM and all the benefits that could be achieved, not just for ourselves, but to clients, end users, design teams and many more.

The project we have included in our submission is an example of how even at the construction stage of a project, introducing a 3D platform containing project information can be a successful in saving time, cost, clarifications and other efficiencies within the process.

Project Summary

The redevelopment of the Goethe-Institut’s Irish Headquarters in Dublin city centre, Merrion Sq. will see the 1790 Georgian townhouse refurbished to its period glory in addition to welcoming the creation of a new garden and contemporary mews building on the site.

The new building will showcase a new cultural/events space, a unique library and information service, and a German public cafe to cater for all enthusiasts of German culture. In addition to the main building, the creation of a new garden and contemporary mews building, which will hold the new language school, is included in the project.

The contemporary build consists of a sub-parterre level over most of the site with a split level three-storey mews above. A further part-basement of storage and plant is also planned.

A new garden is planned on the podium level between the existing house and the extension in line with the historical precedent. To mitigate the scale of the mews development, the new build makes a material distinction between a solid base (including the garden walls), and an emergent crystalline form. The brick base will be covered in a thin pigmented slurry render, similar to the historical tuck pointing of the main house albeit without the joint definition.

The emergent crystalline form will be glazed with a bespoke vertically spanning high performance triple glazing system. An interlayer of copper mesh will be installed between the outer two layers of glass. This provides a mild vision screen and acts a solar gain protected layer. The building will alternate between reading as a glass box and a metal box. At night the building will read differently again as some sections of the glass box are opaque and others are transparent.

The combined new and existing building will achieve a Building Energy Rating (BER) of A3 which will set a new standard for conservation projects in Georgian Dublin.
Innovative use of BIM

As projects these days are looking to move more and more into BIM, there have been a couple of issues that we have come across in the last year or so that has required Stewart to be intuitive in its application and resourceful in its implementation to make it work. We have found that unless the client has an initial fund set aside and requests the use of BIM on the project from the conceptual stages that the benefits realised from BIM are not always that apparent. There may be an extremely detailed 3D model which is an accurate representation of the intended project, but unless the file is not only accessible but also understood by all members of the design team then people will continually revert back to the traditional ways of thinking carrying out tasks.

For this to be overcome we have found that in-house training is the best method for staff to learn to adopt the software. We realised that just a few members in the company require full versions of the drafting software, for everyone else free-viewers provides enough information as long as they know how to access it.

As mentioned above for a project to successfully achieve BIM level 2 the strategy of BIM should be “adoption from the conceptual stages of a project”. So what do we do if it isn’t specified by the client? Many contractors nowadays realise there are benefits to BIM, but it’s often considered that if it isn’t brought onto a project until late during the design or construction stage then it’s already too late. The project we are looking at is exactly this scenario. The initial drawings were drafted years ago and we’ve developed a 3D model from the existing drawings, there was no BIM strategy in place and we have decided to draw up a BIM execution plan and EIR. Several others contractors have agreed to develop their relevant disciplines using BIM software and weekly coordination meetings are being held between members of the design team. For all intents and purposes this will be a BIM level 2 project, although contractually it won’t, and there is no requirement from the client or end-user for a fully federated model.

Collaboration & Communication

Although we are not bound by contractual agreements and requirements in this project we wanted to adhere to as much of the PAS 1192, BIM Protocol and supporting documentation as possible. Although we could not follow the BSI code of practice for naming conventions we aligned the existing procedures in place with them as best we could.

This required a certain level of understanding and accommodation from each design team member. As there was no universal file format or software outlined at the beginning, contractors were under no contractual obligation to purchase software that was compatible with our own. Fortunately, to date, everyone happened to have a software package that was compatible with one another, or a variation of it. This alleviated a lot of potential issues that could have arisen otherwise. Because this project is a relatively small scale project the number of contractors meant collaboration and communication was much more localised than large scale jobs we’ve been involved on with BIM.

In our experience less numbers on site or at the table leads to a clarity and better understanding of responsibilities, this is also true when trying to establish who is required to do what in a 3D model. Coordination meetings were set up on site, using a projector screen and the latest federated model
containing each of the contractors latest individual models allowed us to navigate around and address each issue as they were identified.

Interoperability

This issue was addressed from the initial kick off meeting we had with the design team and other contractors. Outlining the software packages from the beginning as well as their version types was something that we overlooked in previous projects and led to a huge amount of hassle down the line in terms of interoperability. As fortune would have nearly all the teams were using the same software packages and those that weren’t had been intending on purchasing the product.

Specifying the version of the software was also important as certain products, even within the same platform, will not let users view models that have been developed in a later version. This lead to a smooth transition of models between difference contractors and disciplines, however from experience if this isn’t made clear from the beginning can have costly and time consuming repercussions trying to link and import various file types that just do not want to come together.

Use of International Standards

As the use of BIM was introduced to this project during the construction stage and only as a proposal to help streamline the process and assist in coordination rather than contractual obligations specified by the client. We only looked to align the existing procedures that were already in place on the project with the PAS 1192 documents, BIM Protocol and the CPIx documents. Together these files encompass what can be classed as a Level 2 achievable project if it complies each of the document and the supplement files.

Together with PAS 1192-2:2013, which dictates the overall procedure for implementing BIM, a dedicated Execution Plan was developed, this in conjunction with PAS 1192-A2 ‘A collaborative production of architectural, engineering and construction information – Code of practice’, a new folder structure, file and layer naming system and Common Data Environment was introduced. As the client had not specified they wanted a Level 2 BIM project from the onset there had never been a case for developing a model for facilities management purpose on handover. We therefore decided that not every disciple of the model needed to be at LOD 500. A matrix was developed after discussion with the clients representative as to what LOD (either 400 or 500) would be achieved using the ‘Level of Development Specification’ – For Building Information Models: 2013

There are an array of various standards out there that we could have looked at, but for us the most important were the AEC BIM Protocol, CPIx documents and PAS 1192 as these are recognised and have gone through the processes of becoming British Standards.

Education and Training

The adoption of BIM within Stewart didn’t happen overnight. If fact it took a lot longer than we had anticipated and we went through a number of project that had a half-hearted injection or aspect of BIM associated with it. The majority of these project only scratched the surface of used BIM.
Without a set procedure and protocols in place to many variables detract from the efficiencies that BIM should create and in many cases its benefits are never realised because of the ambiguity that it causes rather than clarity. One of the best steps that we took was to have our staff take the BRE training course. Although a company needs drafters who are capable of using the software itself, it’s also needs staff who are educated on the methodology behind taking the information in the model and using it on site.

The physical model is just one aspect of BIM it’s the creation, management and correct distribution of information contained within it that makes BIM work. Which requires project managers/engineers/architect to all have a basic understanding of what is trying to be achieved and how. To date 6 of our staff have taken the ‘BIM Introduction’ and ‘Project/Task Information Manager’ courses over in the UK ranging from Managing Director, Project Managers and dedication BIM Information and Task Managers.

A number of the staff working on this project were also sent on introductory courses to the drafting software in the past through ArcDox, an Autodesk certified vendor and software training agent. This, in conjunction with in house training that is provided by our BIM Manager, allows for any issues with the software to be tackled on site and internally, rather than having to outsource any of the modelling saving time and cost.

Risk Management

It is our intention, as we have done on many previous project to link the 3D to the construction programme that is in place to develop an accurate time line of the build; including material delivery and lead times, construction of various systems as well as coordinating temporary works on site, including scaffolding, relocation of the site offices during different phases of the build and more. The benefits of this tool that we have found in the past and to date on site is; a sophisticated means of delivering a plan of action to site workers - 3D visualisation of work is simple to interpret and improves cohesion amongst all site members to complete assigned tasks.

This was particularly relevant to this project as the site is located in the city centre, required a number of supports and bracing to the neighbouring building and made the entire site very congested. Having the site modelled allowed us to determine a number of various scenarios for the crane location, design of the crane slab and how it would fit in to the existing floor slab design, site office locations and access routes which in turn fed in to the safety of the site.

The health and safety of Stewart sites is paramount to us, although we didn’t look at a stand-alone health and safety model we did incorporate elements into the site model; such as handrails, kick boards and appropriate caging to raised platforms and scaffolding. All of these are additional measures taken, in conjunction with standard procedures, to include BIM in the process.

In terms of coordination and raising RFIs on the project we agreed on Navisworks as being the platform for clash detection, and insisted that reference was made back to this where possible. This was managed in the bi-weekly BIM coordination meetings. Prior to works being carried out on site clashes were run between contractors model, RFI and images were uploaded to the ‘Common Data Environment’ and resolved in this manner.
Key Project Outcomes.

As this project is still currently underway all the key outcomes are still to be identified. However after the immediate inclusion of its use, we came to a number of realisations regarding BIM. Firstly it is imperative to have a system of standard in place that everyone can agree on, in previous projects we have experienced a number of problem with the most basic of issues that should be address in a projects infancy. This includes a detailed EIR, although there was no direct request from the client on this job Stewart acted as the client in terms of the BIM requirements which allowed us to dictate exactly what we were looking for from each contractors. This in turn meant we could structure our Execution Plan to suit our needs and those of the other contractors. This was a new experience for us, but by sticking to the procedures and methodologies outlined in the PAS1192 documents we are confident it will produce the desired result from this exercise.

Another point we made sure to address was transparency between all team members, the purpose of using BIM is to create a collaborative environment among the entire design team. Previously on jobs there had been very restrictive access to models and information which defeated the purpose in our opinion so appropriate access was given, which was managed under the folder structures in accordance with BSI’s ‘Collaborative production of architectural, engineering and construction information – Code of Practice’. The outcome of this to date has been effective management of information and also good relationships between design team members.

Conclusion

Our assessment so far is that a project, no matter at what stage, can be streamlined with the introduction of BIM even at a late stage of the process. We were fortunate in a number of aspects in that many of the contractors now use BIM tools as a prerequisite for all of their projects. This meant that there was no need to reproduce work in BIM software that had been done in 2D programs. Were it not for this we realise that the additional time and cost of developing models may have been counter-productive. Another fortunate aspect was that the design team was relatively small but each of them were open to the idea of adopting the PAS1192 documentation as they felt it was in everyone’s interests as it could be used as an exercise to increase their working knowledge of BIM and its application. This was the single most important thing for us in our position on this project, open-mindedness and willingness to learn.