

Bexel Consulting Applied Integrated BIM Approach for Large Hotel and Resort Project



About the Project

Bexel Consulting is a high-tech, construction and engineering consultancy company. They were hired by Karisma Hotels and Resorts to design, build, and construct the Sensori and Nickelodeon Hotels and Resorts. This beachfront resort, placed on the east coast of Dominican Republic, features 460 suites designed to cater to a variety of travel experiences with an adults-only section, decadent honeymoon suites, spacious family suites as well as eight private garden villas. The heart of the resort features The Gourmet Village, showcasing a variety of boutiques, coffee shop, theatre, open-air cinema, wedding plaza, gourmet inclusive bars, lounges and restaurants framed by open-air terraces and reflection pools.

Benefiting from a BIM Methodology

Bexel wanted to coordinate a BIM methodology between all stakeholders from design through to delivery. This included the development of a multi-discipline 3D BIM model based on architectural, structural, mechanical, electrical and plumbing designs. The model was kept up-to-date throughout the project phases and used to conduct regular constructability analysis to detect and resolve conflicts.

Bexel Manager Software was used to prepare advanced construction visualizations based on the BIM model which improved contractors' and other stakeholders' insights into the construction process. A variety of other software solutions enabled a fully openBIM® workflow to deliver visibility and accountability to the client.

LandXML, Design and Design Review

The entire design was developed and reviewed in the BIM authoring tools, Autodesk Revit and Civil 3D. Developing the BIM model included careful analysis and reviews of all original design data. Quality assurance and model validations were done prior to the IFC export.

LandXML data was used for the development of an accurate landscape model which facilitated satisfying requirements for soil excavation or embankment. Data received from the survey was imported in Civil 3D or directly in Revit for generating toposurfaces and landing. The usage of LandXML ensured a solid base for further BIM model development needed for future construction works such as foundation excavations, softscaping and planting.

The IFC files were shared with all stakeholders, allowing clients to easily be included in the process. This helped enable and open collaboration with stakeholders as the process became more complex. Design reviews included comprehensive analysis to ensure there were no scheduling and execution issues. Project requirements included feasibility, speed of execution, cost, local regulations, and more.

The 3D BIM model was used for advanced visualizations and renderings, including animation, simulation, and on-site situational analysis. During the design review, 3D coordination detected around 1200 major clashes. These were subsequently resolved before construction saving time, money, and unnecessary work. Clash detection reports were shared with stakeholders using BCF (BIM Collaboration Format) which was used to create visual reports for design and construction teams. Due to some unexpected changes on the project, this helped to ensure the visibility and impact could be managed. The extensive review processes resulted in an approved design option that reduced the concrete quantities needed by over 40%.

4D/5D Construction Planning, Schedule Analysis, and Optimizations

The baseline schedule intelligently linked with BIM model elements and embedded pricing and cost information enabling 4D/5D simulations. Model-based histograms of materials, labour, and equipment allocation were generated, and resource requirements quantified and calculated.

Project Overview

Bexel Consulting

Location:

Sensori and Nickelodeon Hotels and Resorts, Punta Cana, Dominican Republic

Software used:

Autodesk 3ds Max, Bexel Manager, Civil 3D, Lumion, Revit, Solibri Model Viewer, Solibri Model Checker

buildingSMART tools:

IFC2x3
IFC4
BCF
mvdXML

Other Standards:

COBie, LandXML, Uniformat

Set along a private sandy beach on the Caribbean Sea, this lively all-inclusive, Nickelodeon-themed resort is 9 km from surfing at Macao Beach. This innovative project used a variety of buildingSMART standards and various applications to deliver this complex design.

Highlights:

- 6D BIM provided for the owner
- Point clouds were 380 gigabytes in size
- 7 different stakeholder organizations involved in the project
- Simultaneous design, coordination and progress tracking on 20 buildings using openBIM standards

This further enhanced collaboration across stakeholders making progress monitoring digitally enabled.

4D Simulations notably increased overall efficiency and workforce organisation on site, up to 70% in some areas. All scheduling and cost data were produced in IFC4 file formats for data sharing. The benefit for the client was the ability to accurately track execution progress and total cost of executed works.

Construction monitoring was done by an on-site monitoring team that collected, analyzed, and processed all construction progress data – while generating daily progress and cost tracking audits, executive reports and schedule impact predictions. Quality assurance processes were used during construction to minimize mistakes and avoid problems during the construction phase.

The analysis showed that some of the elements were not built according to project documentation, resulting in updates to the project documentation and additional analysis. This method ensured all potential conflicts were resolved before they could delay construction and result in excess costs..

Quantity Take-off (QTO) and Tendering Packages

Preparation of bid packages was achieved by developing quantity takeoffs extracted from the 3D BIM model. The detailed QTO analysis automatically generated visual representation as part of the tendering documentation. The QTO visual reports provided better insight into the scope of work for contractors who were bidding.

Coordination View

IFC was used for the exchange between the architectural design team (Arqtel, Mexico), the main contractor and designer of mechanical, electrical, and plumbing (grupo Electrico, Dominican Republic) and the BIM construction consultancy and BIM developer (Bexel Consulting). The contract deliverable was monthly IFC 2x3 exchange. Each sub-project discipline model was exported from the native authoring tools.



BIM Collaboration Format

Stakeholders continually shared BCF using IFC viewers. Design teams and the client created notes, issues and views using BCF

Manager and shared those via the online document management system. Issues were reviewed and resolved progressively, eliminating possible problems during future execution on-site and reducing the risk of potential costs and delays. This innovative approach to BIM coordination was strongly embraced by the MEP design team and the client.

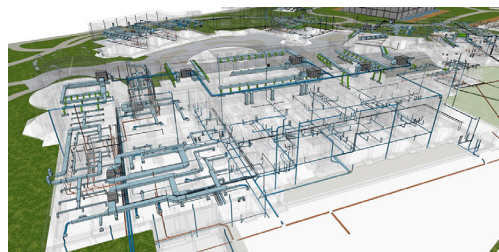
Model Exchange

Standardized Model View Definitions (IFC 2x3 Coordination View) were used in this project to obtain all relevant BIM coordination. Adjustments to view definitions were performed as they needed to obtain all relevant BIM model element properties through the various project stages. For frequent 4D/5D BIM simulations and quantification purposes within the Bexel Manager software, additional model view definitions were used.

Construction Operations Building Information Exchange

The Construction Operations Building Information Exchange (COBie) standards were used for extending the usability of the as-built BIM model. In collaboration with the client, required model elements, especially important for future operations and maintenance were specifically data enriched.

The field verified 'as-built' model with validated data and documentation attached to components was handed over to the client in retrievable IFC format as an aid for managing, operating and maintaining the assets.



The Results

All planned works were completed on schedule and the grand hotel opening was held in June 2016. At the end of the project, a complete asset list, component registers, links to procedures, operation manuals, and other documentation were linked to the BIM model in Bexel Manager and delivered to the client in IFC format with respective COBie sheets.

The 6D as-built BIM model prepared the owner for the facility asset management phase of the lifecycle. This wealth of open, comprehensive as-built information is proving invaluable in the continued operations and maintenance of the Sensatori and Nickelodeon Hotels and Resorts.

“Frequent 4D/5D BIM construction simulations were greatly used for cost and schedule optimizations with BEXEL Manager. In the end, we had as-built BIM model with all required COBie FM data populated. We have recognized implemented BIM processes as one of the key factors that contributed cost and time savings and successful project execution.”

*Juan Carlos Artieda
Projects Director, Karisma Hotels & Resorts*

“This project was large and the great challenge was handling numerous design and construction iterations. We needed to manage entire BIM coordination, project construction and 6D BIM processes by standardizing across all data formats. We’re contented that we were able to effectively manage all the data available and proud to successfully deliver the project to the client using buildingSMART standards”

*Vejjko Janjić
CEO Bexel Consulting*

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