

Project:
The University Heights Redevelopment

Location:
No.42-44, Kotewall Road, Mid-levels West,
Hong Kong

Type:
Luxury High-end Residential Development

Scheduled Time of Completion:
2017

“The designs are very complicated... Without BIM, we would really have a headache with all the abortive work.”

Ben Law,
Senior Project Manager,
Chinachem Group

BIM on Sloped Terrain: Model-Based Efficient Design and Quantitative Estimating



Image courtesy of Chinachem Group

Chinachem Group is developing University Heights, featuring three 13-storey residential towers on a sloping site in Mid-levels. The design also includes a car park, a landscaped garden, a swimming pool and recreation facilities. BIM has helped designers, including with understanding the complex site topography, enhancing interior design, and even safeguarding trees.

BIM Partners Involved:

- Andrew Lee King Fun & Associates Architects Limited
- Far East Consulting Engineers Limited
- CM Wong & Associates Limited
- Rider Levett Bucknall Limited
- Atkins China Limited
- Construction Virtual Prototyping Limited



Image courtesy of Chinachem Group

Consolidating design information

“During the last two years, Chinachem Group has been trying BIM tools to develop architectural, interior, and building services designs,” says Ben Law, Senior Project Manager, Chinachem Group. “We want to know if it is powerful for designing, as well as for costing, and engineering.”

BIM is being employed for University Heights partly as there is unusual terrain, with a drop of 30 metres plus from the front of the site to the back. The slope is uneven, and unlike many sites, it is not possible to create a cut slope due to a Mid-level Moratorium and the location being in a Scheduled Area. Instead, numerous retaining walls will be needed to stabilise the site.

“BIM tools are powerful for handling the design,” says Mr Law. “It is possible in 2D, but time consuming and you don’t get a clear picture. In BIM, we see 100% coverage of the

slope, interface with building foundation, and differences between levels.

The BIM model included the topography, retaining walls, and nullahs on two sides of the site, which helped the structural engineers determine where to put the foundations. And as there is a substantial drop of over metres from the main road, it also aided design of the access ramp for property access.

“I’m worried about clashes,” Mr Law adds. “The architects, structural engineers, building services and landscape designers focus on their aspects of the project. I need someone to consolidate the information into a picture, so we can see what is what, in 3D or 4D.” It might even better if the design team can create BIM model and coordinate themselves.

Clashes with trees, and interior designs

Initially, design work began in 2D. “With BIM



Image courtesy of Chinachem Group

on board, a lot of effort went into 3D,” says Mr Law. “Before that, it is difficult to imagine the relationship between the proposed structures and the site, and existing trees.”

Mr Lau Kan Fai, Senior BIM Project Manager of the project’s BIM consultant, explains that information on sizes of existing tree trunks and canopies was included in the BIM model. Those information was used to check if there is any interference with the future buildings, and with the temporary working platforms.

Given this information, the design team can determine how to minimise impacts on trees, perhaps finding compromises, and minimising any cutting of branches.

“There were several studies to check views for interior design,” says Mr Lau. These included the impacts of the design for the exterior glazed façade, notably its mullions and transoms. Photo montages were used to indicate scenes outside the building.

“Interior designers are sometimes not aware of mullions and transoms in 3D sense, so they may put dividing walls by mullions,” says Mr Law. “When there were changes to the façade, interior designers had to see how they would impact design and how design improvement required, such as for drapery and interior furniture.”

The BIM model revealed other features that would not be obvious from 2D drawings, such as high windows above horizontal transoms,



Image courtesy of Chinachem Group



Image courtesy of Chinachem Group

From the model, Mr Lau created a sequential animation, showing anticipated progress from the existing site, with old building demolished through site formation work, to piling and superstructure. The BIM was linked to a 5D software for exercise of building quantity take-off. The modeling methodology was standardized with aligning to HKSM4, and the data like quantity, trade, specification, standard were linked and formulated in a customized cost plan template in the three-party software. Formulated schedules of trades including piling, RC structure, internal walls, glazed exterior wall, and finishings were exported in previous exercise to assist Project QS in preparing the cost plan. The automatic workflow minimise needs for manual measuring and data input.



Image courtesy of Chinachem Group

The model helped with aesthetics, such as ensuring that the building façade is a window wall, without visible vertical risers for drainage and other building services.

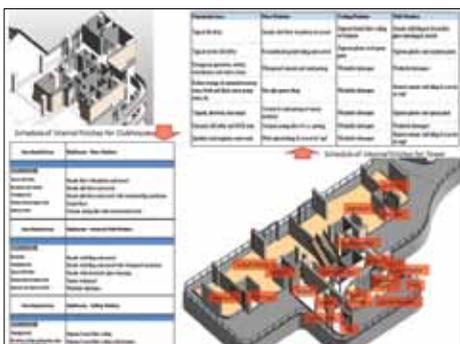


Image courtesy of Chinachem Group

“The building services are very complicated – like spaghetti!” says Mr Law. “If not well planned during the design development, there will be a disaster during construction. Without BIM, we would really have a headache with all the abortive work in terms of design and construction.”

The BIM model helps partly as it includes actual sizes of pipes and ducts, and can show orientations of drainage pipes. Sunken slabs in bathrooms are among features that would be especially challenging in 2D, as they have services laying above them that cannot pass through beams.

Plus, the model serves as a central repository for information on coordination, with a clean list of revisions. “We identify clashes as early as possible, so there is more time for better designs,” says Mr Lau.

and shading devices that were outside.

Avoiding disaster during construction

As the design proceeded, Mr Lau obtained native input including sketches; and updated the BIM model for use in coordination meetings. “We were trying to minimise the coordination life cycle,” he says.

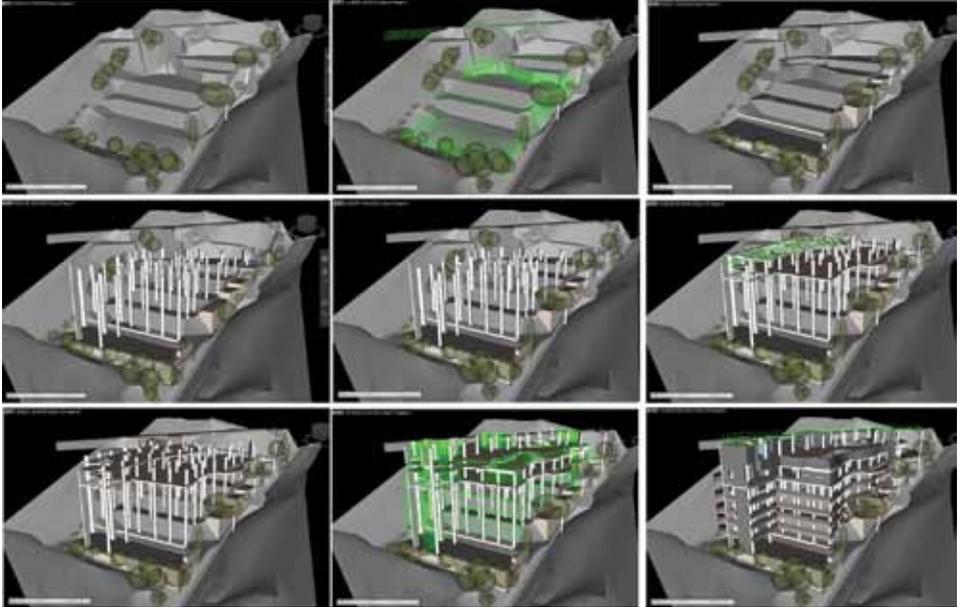


Image courtesy of Chinachem Group

“I expect around 80% of the coordination work were done before construction” says Mr Law. “The others can be easily resolved by the contractors.”

Mr Law believes the BIM model will be used to the end of the project. Indeed, it was a requirement that the main contractor to use BIM, such as for programming site activities and site planning proposal.

“BIM is still new to our company, still in testing stage, and there are discussions about more use,” says Mr Law. “For larger scale or complicated projects, I believe we will involve BIM. I feel that for University Heights, BIM has been helpful throughout the design process – now, we must see how it performs during construction.”

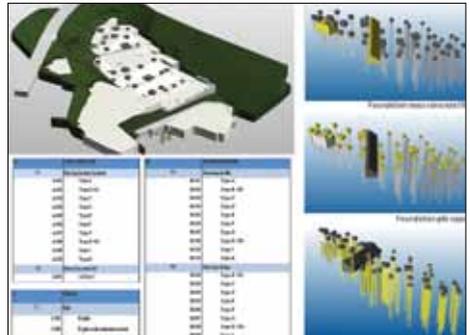


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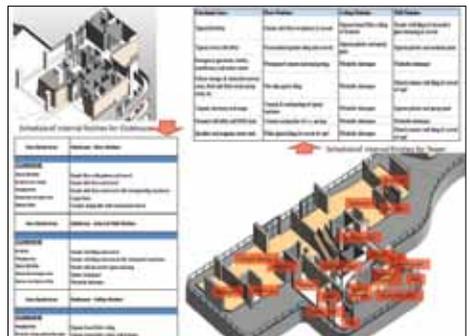


Image courtesy of Chinachem Group

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Chinachem Group



About Chinachem Group

The Chinachem Group (“Chinachem” or the “Group”) is one of Hong Kong’s best-known and most prolific property developers, with a successful corporate history of more than 40 years. Still the largest privately held group of its kind.

The early years of the company were dedicated to exploration of, and investment in, agricultural projects and chemicals, but in the 1960s, the Group was one of the first to see the future of property development in Hong Kong and shifted its focus to the development of the city. It has subsequently contributed tremendously to the city, working to meet the needs of its citizens.

By the mid-1970s, Chinachem had grown from a burgeoning company into one of Hong Kong’s largest property developers. The group has consistently maintained its position as a forward-thinking pioneer in the industry, active in the development of new towns and districts in Hong Kong. Tsuen Wan, Kwai Chung and Shatin were all developed in large part due to the dedication and foresight of the Group.

Through their consistent efforts to improve Hong Kong, the Group continues to create private residences for elegant living for a wide range of Hong Kong’s residents and families.

Today the Group boasts an impressive and diverse range of high-quality properties that span Hong Kong Island, Kowloon and the New Territories, with business interests including hotel ownership and operation, residential and commercial properties, as well as retail and industrial interests in a number of Hong Kong’s best-known and most iconic buildings.

Chinachem has added to its portfolio of business interests on a global scale, investing in ventures related to its core businesses and associated industries, together with biochemistry, electronics, education and finance.