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# DELTA-MARRIOTT HOTEL PROJECT: A CASE STUDY OF CONSTRUCTION INNOVATIONS IN BUILDING A HOTEL PROJECT IN ONTARIO, CANADA

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## 1 DELTA- MARRIOTT HOTEL PROJECT

### 1.1 Project Overview

The Delta-Marriott Hotel is an 8-storey hotel situated at Prince Arthur's Landing on Thunder Bay's waterfront, Ontario (Figure 1). The Delta-Marriott Hotel has 150 guest rooms and suites including 18 penthouse suites. The Hotel Conference Centre is comprised of a 9000 square-foot conference and seminar spaces including a 5,300-square-foot ballroom, all offering glorious waterfront views, a full-service restaurant and lounge with an outdoor terrace looking over Lake Superior, a high-tech business centre, and a state-of-the-art fitness complex. The Hotel features smart new technology applications. The majority of the hotel rooms have spectacular views of Lake Superior and the Sleeping Giant with a net floor area of 49,896 sq. ft (www.thunderbaybusiness.ca). The owner, ReSolve Group Inc., awarded CANAM group to supply and erect the project super structure including structural steel columns, beams, load-bearing steel stud walls, Hambro joists and forms, open web steel joists, and steel decking.

Figure 1: The Delta-Marriott Hotel located at Prince Arthur's Landing on Thunder Bay's waterfront, ON

Project constraints were transportation distance, compressed schedule, and environmental conditions. Steel components were supplied and fabricated in different locations. D500 Hambro joists, MD2000 Hambro joists, load-bearing stud walls, and part of structural steel components were fabricated in St.

Gédéon, QC; Hambro Deck was fabricated in Boucherville, QC; conventional joists and deck were fabricated in Mississauga, ON plants; and structural steel was partially subcontracted locally. The longest delivery distance was 1,866 km from St-Gédéon, QC plant, to Thunder Bay, ON.

## 1.2 Innovations

From construction technologies employed, design approach, project coordination, to delivery methods, Delta-Marriott Hotel (DMH) was an innovative project. DMH project has an integrated project delivery method in which complete design and drawings were provided along with BuildMaster™ construction service. This project was our first RMR project in which drones were applied to monitor project progress.

### 1.2.1 Integrated Project Delivery (IPD) Method

The DMH project is delivered with an Integrated Project Delivery (IPD) method based on BuildMaster™ approach. IPD is a collaborative approach in which all project participants cooperate to optimize project results, escalate value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction. BuildMaster™ approach, developed in 2010 based on lean project management, relies on master scheduling and look ahead planning (www.buildmaster.com). This approach makes site coordination and project erection, faster, safer and leaner. Through applying IPD method based on BuildMaster™ approach, DMH building construction launched in June 2017 and completed by late September 2017 (CANAM scope of work was completed in less than 4 months).

### 1.2.2 BIM Data Centre

BIM Data Centre is a design and management coordination system which monitors project information. Building information modelling (BIM) is the core of this centre, which enables internal and external communications, and helps design and management team to identify and revise design variations on-time in order to stay on budget and schedule. The project was divided in 8 zones for BIM clash detection: L1, L2, L3, L4, L5, L6, L7, L8 and a total of 107 clashes were detected amongst structural steel components, which have been revised and repaired before delivery to the site. Figure 2 shows zones and examples of detected clashes. A business case study conducted by BIM date centre to evaluate BIM application on the overall project, confirmed that BIM clash detection caused a significant saving on project's budget and schedule.

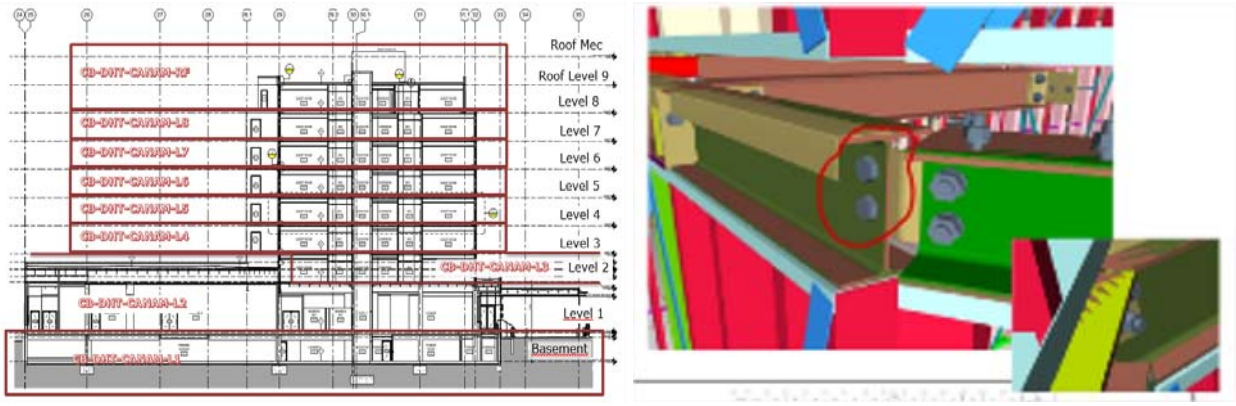


Figure 2: Project zoning: L1, L2, L3, L4, L5, L6, L7, L8 (left picture), an example of a BIM detected clashes on the 1st to 8th floors (right picture)

### 1.2.3 Pre-Fabricated Steel Stud Load-Bearing Walls

In the DMH project around 4,856 square feet of interior and exterior panelized load-bearing steel stud walls have been installed. The Load Bearing wall system on the perimeter is a prefabricated panel system that speeds up the construction. This system is comprised of prefabricated load-bearing wall panels and structural steel components, and provides various advantages such as architectural flexibility, easy and quick installation, UL fire rating certification, high thermal insulation, and simple economic relocation of

panels for expansion (www.canam-construction.com/en/construction-products/prefabricated-steel-building/). The application of prefabricated steel stud panels for DMH project, reduced the construction and erection speed by almost 50%.

### 1.2.4 Drones

The DMH project was our first RMR project in which construction drones were applied to monitor project progress on a daily basis. A few different models including DJI Phantom 4 PRO Quadcopter Advanced drone were used to take construction pictures and map the DMH project construction site. High quality construction pictures have been taken to monitor project progress on a daily basis. In the next step, project plans have been overlaid on site pictures to analysis project as-planned versus as-built status in order to control project progress, find design and schedule variances, and take corrective measures in a timely manner (Figure 3).

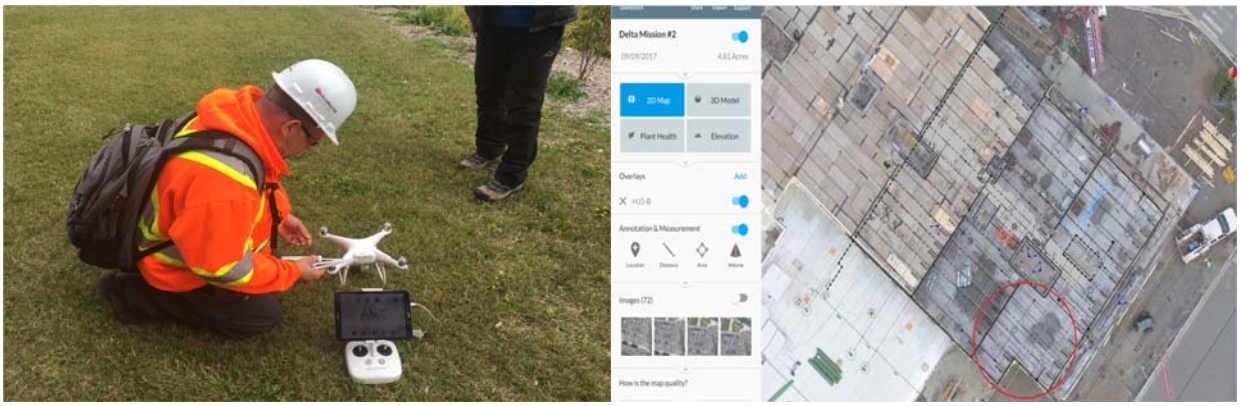


Figure 3: The Drone used to take aerial pictures of the DMH project (left picture), an example of overlaid site picture with a planned layout to monitor construction progress (right picture)

### 1.3 Lessons Learned

Challenges faced during the course of this project were: (a) drones application in the wet and windy waterfront weather circumstances (Figure 4); (b) unpredictable weather and road conditions for material transportation; (c) damaged material replacement time and cost to stay on schedule and budget. Lessons learned for future projects are: to increase the application of drones for monitoring construction progress and apply more advanced drones capable of taking high quality pictures in uncertain weather conditions; to enhance BIM Date Centre and building information modelling techniques for coordinating similar projects; and finally to have alternative fabrication origins, and transportation means.

Figure 4: The Delta-Marriott Hotel located at Prince Arthur’s Landing on Thunder Bay's waterfront, ON

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