

# Modular Passive House Bella Bella, British Columbia

Case Study



## Low-rise Energy Saving

The Bella Bella Project is a multi-unit residential townhome complex, purpose-built as staff housing at the R.W. Large Memorial Hospital in Bella Bella, B.C. It is the first modular-built Passive House in Canada, as well as the first Passive House located in a First Nations community. The complex includes six, two-storey, two-bedroom residential units, and replaces an aging complex destroyed by fire at the same site in 2014. The project was precision built by Metric Modular in its climate-controlled factory in Agassiz, BC, then assembled on-site by Metric Modular and Spani Developments Ltd. It meets aggressive Passive House energy targets and consumes 80 per cent less energy than a similar complex built through standard construction.

## The Goal

In the remote First Nations community of Bella Bella, BC, the energy demand for most homes and buildings is largely supplied by diesel fuel, known for contributing to greenhouse gas emissions. With the new construction, the project owner and developer, Vancouver Coastal Health, saw an opportunity to set a new standard in the community that could serve as a model for better and more affordable building practices, while contributing to a carbon reduction strategy and energy conservation moving forward.



## The Challenge

Limited access to trades and materials, combined with the project location and climate posed formidable challenges. Conventional construction was ruled out due to a short construction season and the need to barge all materials to the site. Prefabricated panel solutions were also discounted due to their vulnerability to weather. Bella Bella experiences some of the wettest weather conditions in British Columbia, with a relative humidity over 60% for most of the year and an average monthly rainfall of over 700 mm. In order to achieve its ambitious energy conservation targets, careful consideration would need to be given to construction methods and detailing, transportation, and the overall quality and resiliency of the building envelope.

## The Solution

High quality insulation is central to passive construction, creating an optimal indoor climate by minimising the need for active heating and cooling. Depending on the climate zone, houses built in Canada will likely need between three and seven times better insulation performance than that provided by current national and provincial Building Codes, in order to achieve Passive House performance. ROCKWOOL stone wool insulation products were used extensively to achieve a building envelope that could meet the strict Passive House energy requirements, resist moisture and provide excellent drying potential of the wall assembly. ROCKWOOL Comfortboard® 80 blanketed the exterior of the modules to form a continuous layer of insulation that serves to reduce thermal bridging and provide excellent sound control that's important in multi-unit construction. In the assemblies between party walls, two layers of ROCKWOOL SAFE'n'SOUND® were used in combination with Type X gypsum to achieve a 45-minute fire separation rating.

"Modular construction proved the right choice for this particular project and provided several distinct advantages," says Craig Mitchell, Director of Innovative Solutions, Metric Modular. "It cut construction time significantly, allowing us to deliver on the short seven-month timeline, whereas a conventional site-built complex would have taken close to two years to complete. Modular construction is also well-suited to accommodate a lot of Passive House details within a manufactured environment and allow air testing to take place in a controlled setting. Importantly, we also avoided the extreme weather conditions which would have created significant challenges on site. Finally, modular construction kept labour and site work costs in check in order to meet budgetary goals."

In the end, modular construction achieved a super-tight building envelope in a controlled setting, delivering on precise quality and efficiency standards. The Bella Bella complex demonstrates that quality, cost-efficient, safe, durable, resilient and sustainable housing is possible to achieve in remote Canadian communities, accommodating harsh conditions and short construction seasons. The benefits are tremendous, allowing for greater thermal comfort, better indoor air quality, superior sound absorbency, and exceptional energy efficiency.

The building's simple mechanical systems require little maintenance, while its high mineral wool insulation levels reduce heating and cooling costs, increase drying potential to inhibit mold growth, while reducing reliance on expensive fossil fuels.

### **ROCKWOOL™ Products used:**

#### **Year**

2015 - limited 7-month construction period

#### **Architect**

Mobius Architecture Inc.

#### **Owner/Developer**

Vancouver Coastal Health Authority

#### **Passive House Consultant**

Red Door Energy

#### **Building Envelope**

RDH Building Sciences Inc.

#### **General Contractor**

Spani Developments Ltd.

#### **Modular Fabricator**

Metric Modular (formerly Britco Construction)

#### **Building Type**

Multi-unit Residential Attached Townhome Complex - Staff House

#### **Size**

5,376 sq. ft.

#### **Application Product Type**

Wall, Ceiling, Roofing, Exterior Cl

#### **Certification**

Passive House Certified by Canadian Passive House Institute

#### **Notable**

Uses 80 per cent less energy and generates 80 per cent less carbon emissions than a traditional built residential housing