

BUILDER INSIGHT



Bulletin No 1 | 330 Goldstream Avenue

Lean Construction: High-Performance Wood Social Housing Project

Project Introduction

Located in the City of Colwood in the Capital region of Vancouver Island, 330 Goldstream Avenue comprises 102-units of nonmarket housing for individuals, couples, and families with low-to-moderate income.

Developed by the Greater Victoria Housing Society (GVHS) and funded by BC Housing, the six-storey wood frame building comprises 6,121m² (65,862ft²) of gross floor area over two storeys of underground parking. The building accommodates a range of unit sizes – 50 studios, 39 one bedroom, one two bedrooms and 12 three bedrooms. During the design phase, Cascadia Architects and RDH Building Science based their target performance on Step 4 of the yet to be adopted BC Energy Step Code: the highest step for multi-unit residential buildings.



Completed 330 Goldstream Ave

Photo courtesy James Jones in media publications
& @jamesjonesphotos on Instagram

This bulletin series covers different aspects of this innovative social housing project. Find them all in the BC Housing Research Centre Library.



FACTS AND FIGURES

Construction timeline:

January 2019 – May 2021

Construction budget:

\$18.99m

Residential units:

102

Site area:

3,820m² (41,103 ft²)

Total Gross Floor Area:

8,323m² (89,555 ft²) inc. Parking

Gross Floor Area, Residential:

6,121m² (65,862ft²)

Building Height:

23.9m (78.4ft)

Occupancy Classification:

BCBC 2012, Group C- Residential
(6 levels), Group F3 – Garage (2 levels)

PROJECT TEAM

Owner:

Greater Victoria Housing Society

Architect:

Cascadia Architects

Envelope and Energy modelling:

RDH Building Science

Structural Engineering:

RJC Engineers

Building Code and fire science:

GHL Consultants Ltd.

General Contractor:

Kinetic Construction

Timber and prefab. installer:

Ron Anderson & Sons

Timber panel fabricator:

ZyTech

Siding contractor:

Brytar Contracting

Research management:

Scius Advisory

Lean coach:

Shift2Lean

Video, webcam and photography:

Multivista

Kinetic Construction joined the team at the late design stage to lead the construction consultation process. Kinetic explored adopting Lean Project Delivery methods to deliver the high-performance project efficiently to meet GVHS's budget and scheduling requirements. As part of this process, Kinetic proposed to prefabricate of the exterior and interior walls.

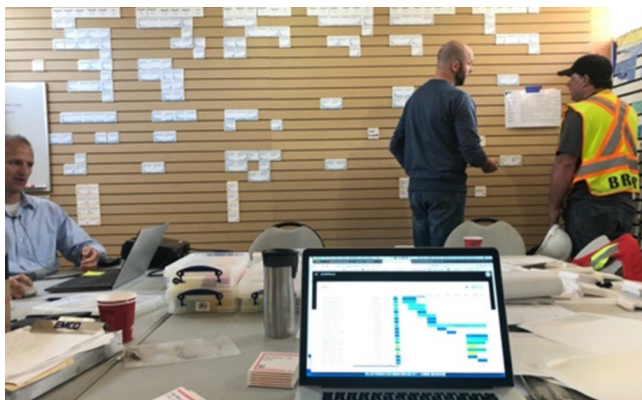
Location

The 330 Goldstream project is in a densifying multi-family neighborhood close to several schools and Royal Roads University. There is easy access to shops, amenities and the Galloping Goose cycling and walking trail. There is also a range of transit options to Langford and Sooke with connections to Downtown Victoria. The site is on a lot that was subdivided from the Pacific Wellness Centre's property at 324 Goldstream Ave.

May 2018	Development Permit submitted to the City of Colwood
May 2018	Kinetic Construction retained for construction consultation services
August 2018	Tender for construction management services opens
November 2018	Construction management contract awarded to Kinetic Construction
December 2018	Development and Building Permits issued
	Mobilization and temporary road construction
January 2019	Construction commences
March 2019	Prefabrication of light wood frame panels begins
October 2019	Prefabricated panels installation begins on site
	Envelope enclosure begins
December 2019	Concrete foundations and parkade complete
January 2020	Six-storey prefabricated structure complete
June 2020	Envelope substantially complete
March 2021	Final full building airtightness test successful
May 2021	Project achieves substantial completion



330 Goldstream site pre-development.



The Goldstream project adopted a version of Lean Project Delivery.



330 Goldstream utilized light-wood frame prefabrication.

An Efficient Building, Built Efficiently

330 Goldstream realizes GVHS’s goals of long-term operational savings and enhanced occupant comfort. The building provides a model for the attractive and efficient organization of high quality, comfortable, affordable and resilient housing while achieving very high levels of environmental performance.

To achieve the owner’s goal, the design team adopted an “envelope-first” approach, using Step Code 4’s targets as a guide.

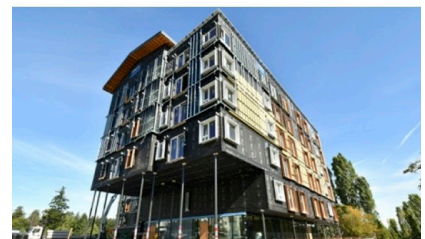
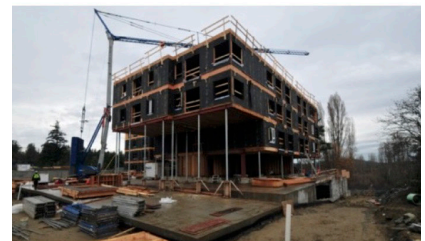
Performance Standard	
Required for Step 4: Thermal Energy Demand Intensity (TEDI)	15 kWh/m ² /yr
Required for Step 4: Thermal Energy Use Intensity (TEUI)	100 kWh/m ² /yr
Additional Performance Goal: Air tightness	0.6 ACH @ 50pa

Step Code 4 metrics was used as an informal metric of success. The project achieved an airtightness test result of 0.55 ACH50 – exceeding the Passive House standard of 0.6 ACH50.

The construction team utilized prefabricated, light wood-frame panels with a pre-applied air barrier membrane for the exterior load-bearing walls. This increased the potential to speed up construction while achieving high degrees of quality control. The construction team also used the project to test the usefulness of Lean Project Delivery methods for multi-family, affordable housing, as a way to successfully deliver high-performance innovative projects efficiently.



Goldstream rendering by Cascada Architects.



330 Goldstream under construction.
Source: MultiVista

Project Features

Site Design

The building offers many opportunities for residents to socialize and enjoy the outdoors. There is a south facing covered courtyard garden on the front side of the building landscaped with curving concrete walls, seating and native plants that provides a sheltered seating space. The common room spills out into the courtyard, providing an extension outside to enhance social interaction.

Unit Types

All suites have a full range of kitchen appliances, as well as large operable windows and “Juliet” balconies for daylight and natural ventilation.

44 x Studio	33m ² (355ft ²)
6 x Studio (accessible)	36m ² (391ft ²)
34 x 1 Bedroom	50m ² (544ft ²)
5 x 1 Bedroom (accessible)	57m ² (611ft ²)
1 x 2 Bedroom	71m ² (765ft ²)
12 x 3 Bedroom	93m ² (1,002ft ²)

High-Performance Building Envelope

Typically, the exterior wall was 300mm (11¾") thick. The assembly comprised 89mm (3½") of batt insulation installed within the 2x4 wood frame wall structure. Drywall was on the interior face of the wall. On the exterior face of the framing there was 12mm (½") plywood sheathing and sheathing membrane (serving as an air, vapour and moisture (AVM) barrier). 150mm (6") of mineral wool insulation was installed over the sheathing using fiberglass clips. On the outside of the wall was the rainscreen cladding system. See Bulletin #3: Energy Efficient Light Wood Social Housing Project, for more details.

High-Performance Building System

The building mechanical system comprised three Swegon Gold RX HRVs which provide heating, cooling, and ventilation with up to 86 percent energy/heat recovery.

Two Lochinvar Knight XL high efficiency natural gas boilers are used for the domestic hot water.

Project Challenges

Construction Budget vs. Step Code 4

Working out at about \$270/sf based on BC Housing’s Design and Construction Standards, the pre-design project budget of \$18.99m did not contemplate the possible labour and material premiums for achieving Step Code 4.

The project team knew the budget was tight, especially given the escalating costs of construction in 2017/2018. Nevertheless, GVHS understood that a Step Code 4 design would not only deliver operating cost savings but also contribute to enhanced occupant comfort by minimizing air leaks (which cause drafts) and moderating climate impacts (such as temperature and air quality) on internal conditions.

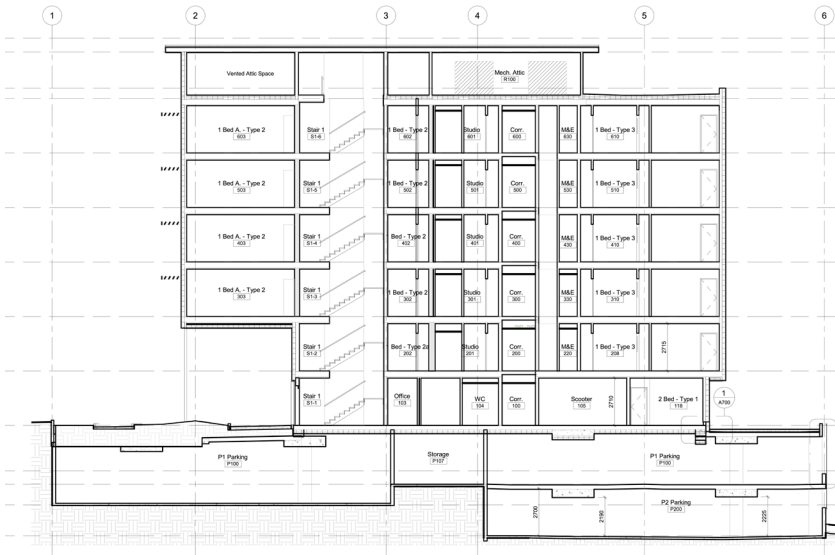
Site Constraints

The subdivided “pan-handle” site is bounded on all sides by existing properties. GVHS and the construction team worked in close cooperation with all neighbors during construction. Access to the site required a temporary road through the Wellness Centre property which was on Goldstream Avenue south of the project site and all delivery and equipment traffic had to be routed through Wade Road on the north of the site.

The bound site also had very limited area for Kinetic to locate the site office or for lay-down space. A field was rented adjacent to the site to stockpile the fill generated from excavation. The site constraints were a major factor in Kinetic’s decision to prefabricate and use “just in time” delivery, thereby reducing the need for lay-down space on site.

Tight Local Labour Market

Kinetic is an established contractor based on Vancouver Island and familiar with local labour challenges. During the construction period for 330 Goldstream (2017-21), labour demand on the island exceeded supply. This applied upward pressure on labour costs and affected scheduling, further threatening Goldstream’s budget and schedule.



330 Goldstream main section (Source: Cascadia Architects)



Typical residents' corridor



330 Goldstream Ave typical floor plan. (Source: Cascadia Architects)

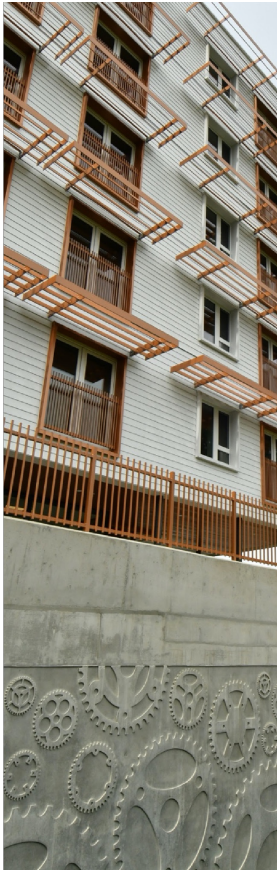


Suite kitchen

Photos courtesy James Jones in media publications
& @jamesjonesphotos on Instagram



Suite outdoor access



Parkade feature wall and sun shading.

Photos courtesy James Jones in media publications & @jamesjonesphotos on Instagram

330 Goldstream Bulletins

The 330 Goldstream project bulletin series supports the advancement of innovation in affordable housing construction. BC Housing hired Scius Advisory to provide 3rd party documentation services. The project was monitored via webcam and monthly progress photography provided by Multivista. Scius shadowed the project team and interviewed project team members at key project milestones.

In addition to this bulletin:

Bulletin No. 2: **Project Delivery: Lean Project Delivery**

Bulletin No. 3: **Building Energy Performance: BC Step Code 4**

Bulletin No. 4: **Prefabrication: Light Wood Wall Panels**

Bulletin No. 5: **Digital Tools**

Bulletin No. 6: **Project Debrief**

Bulletin No. 7: **Building Code and Permitting**



Common area patio



Residents' garden

Acknowledgement

BC Housing gratefully acknowledges funding support from Forestry Innovation Investment for this bulletin series. Our sincere appreciation to the Greater Victoria Housing Society, and the entire project team for their cooperation.

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