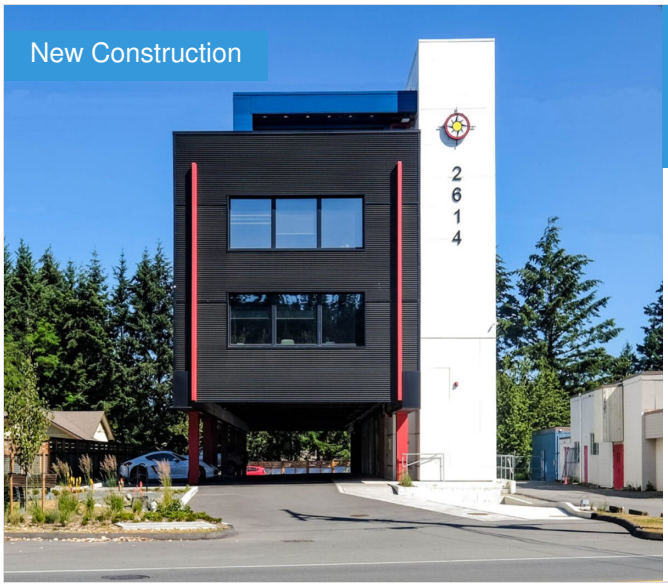
Charter Telecom headquarters

by Sarah King / 2021-04-02 16:23:16 / International / 6707 / EN



Primary energy need :

59 **kWhpe/m².year**

(Calculation method :)

Building Type : High office tower > 28m
Construction Year : 2019
Delivery year : 2019
Address 1 - street : BC V8T 4N VICTORIA, Canada
Climate zone : [Csb] Coastal Mediterranean - Mild with cool, dry summer.

Net Floor Area : 903 m² Other

Certifications :

General information

The Charter Telecom headquarters building, located in Greater Victoria, is the first commercial office in North America to achieve Passive House Certification. It is also ambitious in its use of locally sourced engineered mass timber. First and foremost, this project has demonstrated that the Passive House standard can provide value to private commercial building owners without incentives or subsidies, and that the main motivations of the owner were not primarily about sustainability (although that was a factor) but a larger emphasis was on creating a quality working environment for their staff and for investing up-front to achieve lower operating and maintenance costs, and lower life cycle costs overall. The typology and scale of this project sets it apart from other Passive House projects in our region, and we hope this project will be a catalyst for high performance buildings in Canada to expand into the non-residential market. The success of this project proves that massive improvement in energy performance is achievable in a commercial office building, on a challenging site, and with builders who did not have previous experience in high performance buildings.

STRATEGIC DECISIONS

- Passive House certification was a goal from the start, and influenced decision making throughout.
- Massing was driven in large part by decision to avoid an underground parkade - less concrete (embodied energy) and ability to replace parking with

landscaping in the future (transit is likely to improve in the area leading to reduced parking needs).

- The ground floor, exit stairs, and elevator were excluded from the heated envelope. This improved the form factor and avoided thermal bridging and airtightness challenges around the foundation to superstructure connections, which could have resulted in missing the Passive House performance targets.
- A large stair and atrium at the centre of the building acts as a gathering space and as a way of encouraging people to use stairs instead of the elevator.
- The geometry of the building presented challenges for the seismic design in this high-risk zone. An asymmetric load path and narrow width available to transfer shear forces to the foundation led to significant forces acting on certain members and connections, which would normally suggest steel or concrete. Using these materials would have resulted in significant thermal bridging challenges and higher embodied energy. This influenced the decision to use Cross Laminated Timber (CLT) for shear walls and floor diaphragms as a structural solution that could handle the high loads while minimizing the impact of structure on thermal bridging.
- Engineered mass timber structure was chosen also as a way to sequester carbon, along with the use of cellulose insulation.
- Only a limited number of local trades have Passive house experience or training, and none of them on a building of this type. Since proper execution of the envelope is essential to successfully achieving a high performance building, care and attention during design was given to construction sequencing. A simplification of sub trade scopes allowed for coordination and sequencing meant that every trade need not be familiar with passive house principals. A three layer system for the envelope was designed, each associated with work for a particular sub-contractor: structure, thermal & air barrier, and cladding. The structural sub-trade and the cladding sub-trade did not have to do anything differently from what they normally would, and the crew that did have training in high-performance envelopes came between them to do the sensitive work.

EDUCATION AND INFORMATION SHARING

- Building has already hosted tours for industry members, for policy makers at a provincial level, and for building officials and planners at a municipal level.
- Building will host events organized by Passive House Canada for the high performance building community in the future.
- This building has been presented as a case study at the North American Passive House Network Conference 2018, the Passive House Canada Conference 2018, the BC Wood Solutions Conference 2018, the Passive House NorthWest Conference 2019 and the International Passive House Conference 2019, as well as numerous local industry events.

Photo credit

Sarah King
Waymark Architecture

Stakeholders

Contractor

Name : Waymark Architecture
Contact : info[a]waymarkarchitecture.com (888) 206-0123

Construction Manager

Name : Integral Group

Stakeholders

Function : Certification company

CertiPHIers Cooperative

Function : Others

Bernhardt Contracting

Function : Others

Blackwell Structural Engineers

Function : Others

Road's End Contracting

Energy

Energy consumption

Primary energy need : 59,00 kWhpe/m^2.year

Breakdown for energy consumption : Primary energy needs to PER values.Heating :demand: 2 kWh/(m2a)load : 6 W/m2Cooling : Cooling + dehumidication demand : 5 kWh/(m2a)Cooling load : 0 W/m2

Envelope performance

Envelope U-Value : 0,12 $W.m^{-2}.K^{-1}$

Air Tightness Value : 0,50

More information

Heating needs were kept to a minimum with an excellent thermal envelope (high insulation values, tripleglazed high performance windows, airtightness, thermal bridge free detailing) and high performance heatrecovery ventilation. Cooling needs were reduced through strategic glazing and choice of glazing with lowsolar heat gain coefficient.

Renewables & systems

Systems

Heating system :

- Fan coil

Hot water system :

- Heat pump

Cooling system :

- VRV Syst. (Variable refrigerant Volume)

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic

Other information on HVAC :

What little heating and cooling is needed is provided by a VRV system, selected for its ability to provide simultaneous heating and cooling in different zones and to internally recover heat as well as its high efficiency cooling operation

Rough-ins for rooftop solar have been installed.

Roof area is expected to be more than sufficient toprovide more power than the building needs to operate.

Electric Vehicle charging stations.

Environment

Urban environment

- Location chosen to reduce commuting distances for company's staff, along transit routes, and near other amenities.
- The building is located at the edge of a rapidly developing area, a design goal was to set the tone for the development of neighbouring properties.
- By lifting the building above surface parking more area is available for landscaping and as transit is likely to improve in the area leaves open the possibility of reclaiming parking stalls with landscaping in the future.
- Located on a previously developed but underused site, replacing a small building at the end of its life cycle
- Densification along a main transportation corridor.

Costs

Construction and exploitation costs

Total cost of the building : 4 500 000 €

Health and comfort

Life Cycle Analysis

Eco-design material :

ENERGY PRESENT AND FUTURE
• Present: engineered mass timber is a low embodied energy structural material.
• Future: by avoiding an underground parkade the use of concrete was significantly reduced, lowering theembodied carbon footprint of the building significantly.

Water management

Low flow fixtures.• All stormwater is managed on-site (without even an overflow to a stormwater system). Water is directed to a rock pit under the parking to percolate back into the ground.

Indoor Air quality

- Space planning in the building keeps areas where people will stay close to operable windows for light and air, while areas farther from windows are dedicated to circulation and services.
- Heat recovery ventilation provides constant fresh air; CO2 levels are monitored and if they increase will trigger additional ventilation

Comfort

Health & comfort :

- Exposed wood structure provides a biophilic element in all main spaces of the building.
- A large stair and atrium at the centre of the building acts as a gathering space and as a way of encouraging people to use stairs instead of the elevator.
- The Passive House standard's comfort and hygiene requirements ensure excellent air quality and thermal comfort, no risk of mould or mildew.
- An hourly analysis program was used to create a true dynamic simulation of energy movement and demands within the building (i.e. capable of computing the period of peak heating and cooling demand for each separate room and zone within the building, and isolating the specific interactions between solar gains, occupancy, internal gains, envelope losses, and air exchanges), ensuring constant thermal comfort.
- LED lighting is controlled with a sophisticated software package that optimizes lighting levels using datafrom smart sensors (occupancy and ambient), and occupant input

Contest

Reasons for participating in the competition(s)

- A timber construction
- Renewables energies
- Passiv House Certification

Building candidate in the category

Energy & Temperate Climates

Low Carbon

GREEN SOLUTIONS AWARDS
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