



LAUNDRY HAUS

University of British Columbia
THIRD QUADRANT DESIGN Mixed-Used Multi-Family

Project Overview

Changing climate, an attainable housing crisis, and an aging building stock are some of the many challenges Vancouver's housing market faces. The Laundry Haus project, a low carbon impact retrofit of a historic building at the end of its service life, envisions what could be achieved with modernized mixed-use zoning. Laundry Haus is a high performance retrofit of a historic laundry facility located in the Mt. Pleasant neighbourhood of Vancouver currently zoned for light industrial use and bordered by light industrial, commercial, and residential districts.

The existing building has been operated as an industrial laundry facility for over a hundred years and requires major building code and environmental upgrades that are not economically feasible for the current tenants or use. This is typical of many buildings in this neighbourhood of Vancouver.

Rezoning this light industrial district to a comprehensive development would allow for the creation of community that seamlessly integrates into the neighbourhood, while addressing Vancouver's lack of housing options that sit in between single family detached homes, and high rises. Retrofitting industrial buildings at the end of their service life to strict to energy standards, provides a more sustainable alternative to energy and carbon intensive new builds. The Laundry Haus project aims to be a pilot on providing high performance, minimally invasive, middle housing options for sustainable holistic communities in Vancouver.

Design Strategy

Laundry Haus's design revolves around four guiding principles which informed the design of architectural elements and engineering systems: a holistic community, regenerative design, building resilience, and occupant comfort.

project data

location	Mt. Pleasant, Vancouver BC
lot size	51500 ft ² (4800 m ²) 403ft x 128ft (123 m x 39 m)
units	61 Units (272 residents)
unit types	loft 1,2&3 bedroom, & town-houses
median age	39.9
average household	2.2 people

project specifications

energy	177kW Roof mounted solar photovoltaic array TEUI: 25 kBtu/ft ²
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heating/cooling	410BTU/hft ² peak heating load 358BTU/hft ² peak cooling load
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building envelope minimum values	walls: R-40
	roof: R-60
	slab above grade: R-30
	slab at grade: R-38
	fenestrations: U-0.15
airtightness: 0.2 ACH@60Pa	

building envelope materials	Insulation: Comfortbatt by Rockwool (Grand Forks, BC)
	Water Resistive Barrier: Blueskin SA by Henry (Scarborough, ON)
	Air/Vapor Barriers: Intello Plus by 475 Building (Supply, Delta, BC)
	Cladding/sidding: Longboard Products (Langley, BC)

estimate	46.5 Million CAD
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holistic



Diverse housing types and accessible amenities such as fresh markets, a café, drug-store, workspaces and a day-care nourish Laundry Haus as a holistic community hub, and cultivate a complete community where occupants have the flexibility to use the space for live, work, and play.



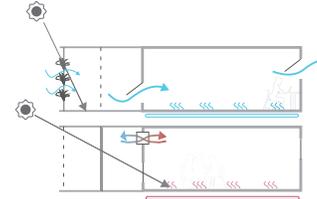
regenerative



Designed to look beyond sustainability Laundry Haus encourages a way of living that promotes enjoyment and restoration of resources. Green roofs, community gardens, rainwater harvesting and recycling, and onsite energy generation, embody the principles of regenerative design.



comfortable



Focusing on comfortable spaces, this design strategy aims to elevate the occupant experience across physical and mental domains. Daylight, natural ventilation, insulated spaces, and radiant heating and cooling provide occupants with an indoor environment shielded from the outside world, and subject to their unique preferences.



resilient



Seeking to future proof, resiliency is considered in every component of Laundry Haus. The Covid-19 pandemic, a changing climate, a mental health crisis, and changing demographics require resiliency in design. Laundry Haus features outdoor green spaces, onsite amenities, fresh air ventilation, and a diverse demographic.

Project Highlights

Presentation:

Icons connect the four guiding principles throughout.

Architecture:

A street in the sky. Laundry Haus features a sunken play-ground connected to a childcare center, a fresh market atrium with exposed original brick façade, an elevated park in the sky, and exterior walkways with porches that overlook green spaces. Residential units are designed with exterior access through sunroom/porch on the south façade, and private balconies on the north providing comfortable spaces which promote gentle transitions from public to private space, and natural ventilation due to the north-south exposures. Material choices are focused on creating an insulated airtight envelope, while paying homage to the building's history and geographical context through the adaptive reuse of original materials, and local sourcing of new materials. The generous green-spaces woven throughout the building with community gardening are regenerative, acting as carbon sinks and supporting closed-loop food growth.

Engineering:

The building's structural systems, existing foundations, and piles were retrofitted to render the site safe for occupancy and meet performance requirements. Locally sourced, renewable CLT and DLT support above grade gravity and lateral loads to minimize the carbon & energy impacts of new construction. The building enclosure and control layers were selected after careful climate assessment and optimization to mitigate overheating while remaining insulated and airtight. Decentralized mechanical ventilation utilizes heat recovery for improved energy efficiency. Optimized window placement and use of thermal mass are designed to promote passive cooling through natural ventilation, meeting cooling demand on all but the hottest days. The capacity for active heating, cooling, and hot water is met by tapping into the False Creek Neighbourhood Energy Utility (NEU), a district energy system that uses sewage heat recovery to heat water. Incoming heated water from the NEU can meet heating and hot water demand using simple heat exchangers, and cooling demand using chillers. Water systems are conservation focused; a greywater recycling system renews shower water for toilet flushing, and rainwater is collected to hydrate the hydroponic vertical gardens that grow fresh produce. Vegetated areas rely on green roof assemblies, and passive irrigation and drainage features such as permeable pavement, sloping bioswales, and vertical gardens.

Market Analysis:

The surrounding light industrial area allows a mixed demographic to rent units at Laundry Haus and be close to work, amenities, and a vibrant community. Panelized construction was used to optimize construction productivity, minimize development costs, and keep building materials sustainable and locally sourced. To incentivize buy-in to Laundry Haus, occupants will be sold on the ethos of regenerative design and are given the opportunity to provide more value than they capture. Using a mixed ownership model, Laundry Haus will feature attainable housing, market price housing, and rentals. This ownership model allows Laundry Haus to deliver housing to multiple socio-economic groups while generating revenue. Our vision is to bring together previously separated groups and create a lasting and complete community.

Durability & Resilience:

Laundry Haus responds to the current Covid-19 pandemic, the local impacts of climate change, and its seismically active location. Convertible semi-outdoor spaces allow for Covid-safe gatherings, and ventilation systems are designed to meet increased air change requirements with increased occupancy to mitigate airborne transmission. As Vancouver's climate becomes more cooling dominant, Laundry Haus's mixed mode systems allow for seamless transition from passive to active cooling strategies. The building structure's lightweight CLT panel segments and connection locations effectively provide exceptional seismic resilience. Onsite power generation, combined with battery storage provides emergency power in the event of grid failure.

Embodied Environmental Impact:

Laundry Haus uses renewable, carbon-neutral mass-timber materials for its structural system, establishing the basis for a low-impact project. Materials from demolished portions of the pre-existing building are retrofitted to be zero-impact components of the cladding and interior finishes. Adapting the site's existing concrete foundation and piles, eliminates the need for disruptive excavation and massive concrete placement. A lifecycle assessment will be benchmarked against that of an equivalent conventional building to guide practical low impact material selection.

Integrated Performance:

The building's architecture has a distinct visual aesthetic that showcases its energy efficiency. Building form, orientation, and fenestration placement were selected to maximize passive design strategies for heating, cooling,

ventilation, and lighting. An airtight, insulated envelope with minimal thermal bridging was designed to minimize exposure to the exterior environment. Once HVAC and lighting loads are minimized, building operations are optimized using smart building systems that adapt to occupant behaviour and changing exterior conditions.

Occupant Experience:

Laundry Haus aims to create a holistic community in which residents live, work, and play. The choice of commercial and community spaces is oriented around the daily rituals of residents. Commercially the building features a café, childcare center, co-workspace, a pharmacy, and market stalls. The residential greenspace is based on research into the psychological benefits of biophilia. Park level family units support informal play for children important to their development. A community kitchen allows for groups to gather and socialize, fostering a sense of community, and the porches allow for informal interactions in passing. Each unit's exterior entry mitigates an obvious source of pathogen transmission. By creating a building which also supports families, Laundry Haus is equipped to adapt to a changing community and demographic.

Comfort and Environmental Quality:

Underfloor radiant heating & cooling, and mixed mode natural ventilation have the potential of significantly increasing perceived thermal comfort. Decoupling heating & cooling from mechanical ventilation optimizes each system for its intended use. In response to intensifying wildfire activity, indoor air quality is monitored in all interior spaces and mechanical ventilation consisting of filtration, sterilization (VOC), and heat recovery, is adjusted in response. Floor surface temperatures are regulated to mitigate moisture concerns from the underfloor radiant cooling system. Exterior noise is not a concern as the building's southern street exposure has minimal east-west traffic, and its east exposure is being transformed into a greenway.

Energy Performance:

Whole-building energy modelling was used to inform design decisions. Vancouver's rainy climate, which receives little in the way of sunshine, was a key factor in determining the building's capacity for on-site energy production. Laundry Haus uses a blended renewable energy system, taking advantage of British Columbia's 96% renewable grid electricity, paired with onsite solar photovoltaic panels to offset non-renewable sources. The use of onsite solar is optimized to meet peak cooling demand on bright, warm, sunny, summer days.