PROJECT SUMMARY

1468 Alberni strives to set a new paradigm for residential design embodying formalist principles relating to iconic buildings of Vancovouer's history.

The proposed project will be sustainably developed, incorporating cutting edge environmental strategies. The project is subject to the City of Vancouver's Large Site Rezoning Policy, Green Policy for Rezonings and Higher Buildings Policy – the latter calling for leadership with regards to sustainability. The overall goal of Passive House certification on a building of this scale provides that leadership and dove tails with the architectural expression proposed.

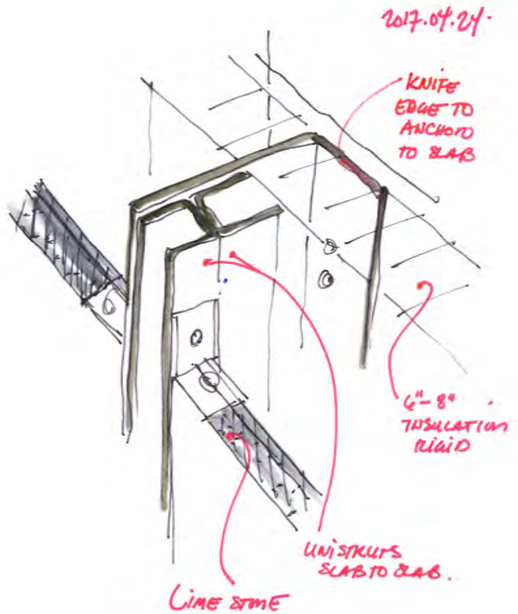
Sustainability is integral to the project. The building's form and architectural expression, with its punched windows and dramatic stone cladding, offers an opportunity to demonstrate what's possible for high performance high rise construction in Vancouver.

LEADERSHIP = PASSIVE HOUSE

Recollective has been retained as a Certified Passive House Consultant for 1468 Alberni. This project represents the potential for a major advancement energy performance in tall buildings. We believe 1468 Alberni will be the largest Passive House in the world.

Any ground-breaking project of this nature will require innovative thinking and a well-integrated team. As design is developed, we envision collaboration between the developer, designers, contractors, the Passive House community, and the City of Vancouver. There will be challenges, but this project truly has the potential to move high performance green building forward both locally and world-wide.

At this stage of design, a number of issues related to achieving Passive House remain to be determined; indeed, any Passive House project in Canada has to determine how best to address the limited supply of certified Passive House components, ensuring trades are capable of executing the design, and confirming the business case is sound.



However, the form of development with its punched window façade and substantial insulation levels puts the project on track for Passive House. The conceptual design has been informed through an iterative process using PHPPv9 to ensure compliance with Passive House certification criteria. Each criteria is discussed in the following pages.

Thermal Energy Demand (Heating and Cooling)

The team has focused first on the requirement to achieve a thermal energy demand intensity of not more than 15kWh/m2 annually. The "envelope first approach" to design ensures energy savings are built in permanently. Homes will be both measurably more energy efficient and significantly more comfortable. Strategies include:

- Continuous exterior insulation
- High performance windows
- Careful attention to detail, addressing thermal bridging and air tightness
- Heat recovery ventilation to provide continuous fresh air at comfortable temperatures

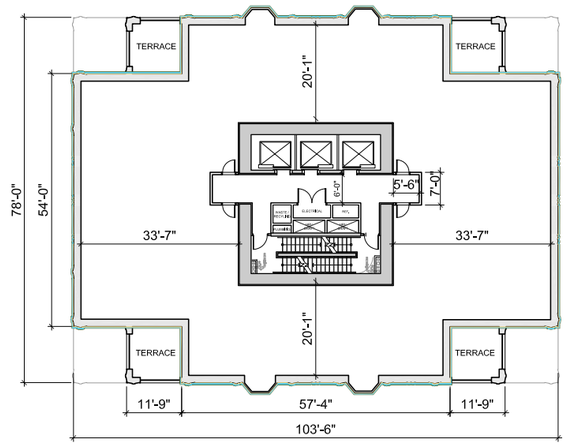
Overheating

Active cooling will be provided to residents, but the goal is to reduce dependency on this system by addressing heat gains passively. Balconies will provide shading to windows of the units below. The articulated building form allows many suites to have windows on two sides, providing potential for natural ventilation.

The team will continue to resolve any overheating issues resulting from internal heat gains with an understanding of the potential impacts of climate change on cooling demand.

Air Tightness

Achieving Passive House levels of air tightness will be assured through careful design details, high quality products, door fan testing and through regular inspection throughout construction.



East Tower - Level 22 to 34
Floor Plate Area: 6982 sq ft
Additional Area Required for Passive House: 143 sq ft

Passive House Additional Area Offsets:
Additional Insulation (63 sq ft) Offset (2.0")
HRV Shafts (50 sq ft Area) Offset (1.8")
HRV Mech Equipment (30 sq ft Area) Offset (1.0")

Total Passive House Offset: +/- 4.8"

All components of the Air Barrier will be identified as part of the construction documents. The continuity of the air barrier will be highlighted on sections and details with a line shown on details between Air Barrier elements. We will ensure the Air Barrier is continuous, unbroken and encapsulates the entire conditioned space. Strategies for air sealing of assemblies, components and penetrations will all be identified in construction documents.

Service penetrations will be minimized and those that are necessary

will be sealed air tight. In construction, consultants will be responsible for constant surveillance of the air barrier.

A Passive House professional will be on board through construction to do regular inspections and provide testing and advice. On the construction-site, both the site superintendant and a designated on-site Airtightness Supervisor will be responsible as "keepers of the air barrier". Where subtrades interact with the air barrier, they will be contractually responsible for air tightness. Careful attention will be paid to interfaces between different trades.

Ventilation

A balanced air supply and extraction system will employ high efficiency heat recovery ventilation, delivering outdoor air to all regularly occupied areas, and extracting from kitchens and bathrooms.

The ventilation system will provide occupant control with boost switches in kitchens and bathrooms. Supply and extract will be balanced and ensure air flow to all rooms without draughts and will operate quietly. All regularly occupied rooms will have operable windows.

Primary Energy

Buildings of this type can have particular challenges achieving the primary energy target. Due to this concern, we've begun a dialogue with other Passive House experts including the international Passive House Institute on strategies. Energy conservation measures identified in the schematic design include:

- Low water consumption plumbing fixtures for domestic hot water
- Enhanced building control system
- Energy monitor and metering system
- LED lighting
- Efficient pumps, fans and mechanical equipment
- Enhanced commissioning
- Pre-treatment of ventilation air using earth tubes is being studied

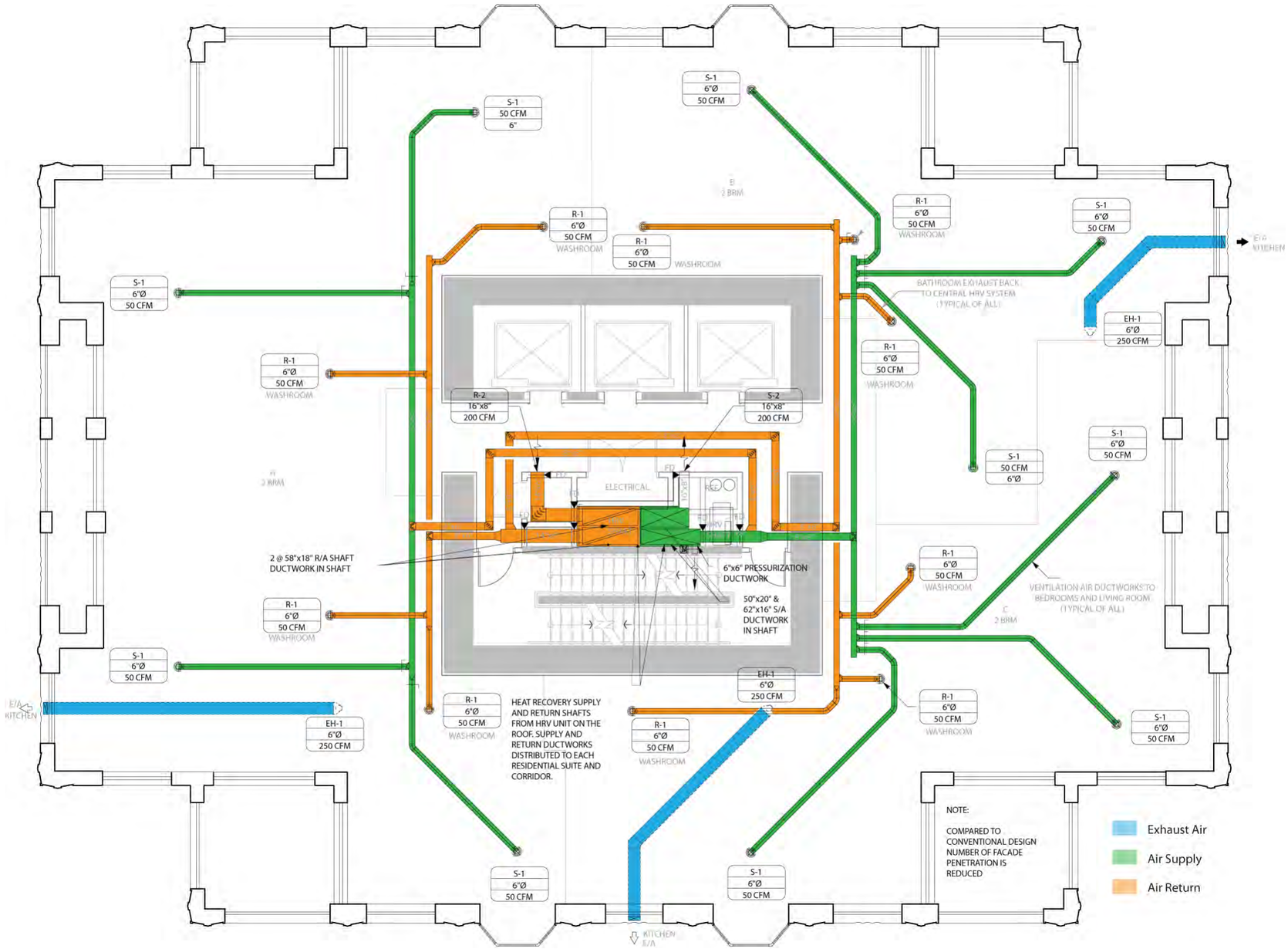
The Development Permit application will include an electronic copy of the PHPP software, and a print-out of the verification page, along with updated information on the approach to meeting Passive House criteria.

Accompanying this will be confirmation from the certifier indicating their involvement in the project. The Building Permit application will include a Design Stage Review from the Certifier.

KEY PASSIVE HOUSE STRATEGIES:

Categories	**Passive House Recommendation**	**Typical Building in Vancouver**	**Note**
Windows	Triple glazing with gas filled U-value at 0.14 SC at 0.3 Glazing Percentage 40%	Double glazing U-value at 0.36 SC at 0.4 Glazing Percentage 60%	
Wall Insulation	Airtight and wind tight R-value at R38	Steel Frame Wall R-15.6 Spandrel Panels R-8 overall	
Roof Insulation	Airtight and wind tight. R-value 56	Roof insulation R-30	
Floor Slab	Airtight. R-value 56	Slab on Grade	
Airtightness	Blower Door Test is required. n50 ≤0.6 h–1 @50 Pa Air leakage ≤ 0.05 ft3/min		
Thermal Bridging	Thermal Bridging Free Ψ≤0.01 W/(m.K) *Insulate balcony slab and envelope corner *Install balcony thermal isolator for connection between window and wall		
Ventilation	Choice of: -PH Certified HRV or ERV required or 3rd party tested and certified Ventilation Unit -Sound Emission ≤35dB (installed) -Heat recovery efficiency ≥75% -Electrical Consumption ≤0.45 W/☒3K -At least 3 levels of control -Ductwork insulated		
Domestic Hot Water energy demand	Heating efficient and cost effective system is required 18-35 kWh/m2year (5,706-11,095 Btu/sq ft year) Sewage heat recovery system recommended. Solar panel domestic hot water pre-heat system recommended.		
Heating and Cooling	Annual Heating, cooling, peak heating load or cooling load, or Primary energy demand, Primary renewable energy have to meet Heating ≤15kWh/m2year(4,755 Btu/sq ft year), Cooling ≤15kWh/m2year(4,755 Btu/sq ft year), Peak heating load≤10W/m2 (3.17 btu/h.ft^2), Primary Energy demand ≤120kWh/m2year (38,040 Btu/sq ft year), Primary renewable energy demand ≤60kWh/m2year (19,020 Btu/sq ft year)		
Indoor Temperature	72 F (22 C) All year around and less than 4 C difference between interior and perimeter		
Economics and Bidding	-Inspection and verification of materials are required (HRV, Windows, gasket, air tight material) -Training the contractors is required -Airtightness quality control at construction-site is required		
Mechanical Equipment	Two Buildings (48 and 43 storey) and podium **Building A:** 300-ton Cooling Tower | 400 Fan Coil Unit (3/4 Ton ea.) **Building B:** 250-ton Cooling Tower | 330 Fan Coil Unit (3/4 Ton ea.) **Podium** 50-ton Cooling Tower | 50 Fan Coil Unit (1 ton ea.)	Two Buildings (48 and 43 storey) and podium **Building A:** 600-ton Cooling Tower | 400 Fan Coil Unit (1.5 Ton ea.) **Building B:** 500-ton Cooling Tower | 330 Fan Coil Unit (1.5 Ton ea.) **Podium** 100-ton Cooling Tower | 50 Fan Coil Unit (2 ton ea.)	

PASSIVE HOUSE VENTILATION DIAGRAM



SUSTAINABLE SITE DESIGN

Sustainability is integral to the project. The building's form and architectural expression, with its punched windows and dramatic stone cladding, offers an opportunity to demonstrate what's possible for high performance high rise construction in Vancouver.

Siting and Orientation

A large development in the dense downtown/west end area built to the lot lines limits the potential for siting within the property. Rather, the focus is on smart growth: choosing to increase density on a previously developed site in an area with full services, amenities and transportation options. The project represents a choice to continue densification of an area fitting for development.

Building Shape and Massing

The floor plates of the towers, concentration of living spaces on the perimeter, and operable windows allow residents to bring in fresh air passively. The articulated form of the building allows many suites to have windows on more than one side, providing opportunities for cross ventilation.

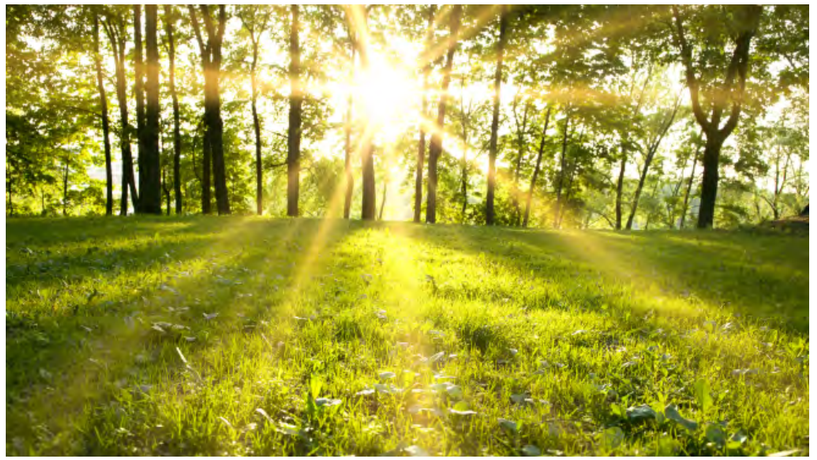
While a tall tower has more surface area than a more compact building, the form provides opportunities for daylighting and passive ventilation. The squareish form of the towers reduces the floor area to surface area ratio.

The design will seek to make best use of daylighting strategies with various measures including:

- High ceiling heights, which allow for taller windows permitting daylight to penetrate deeper into the space.
- Skylights or solar tubes for podium.

Tree retention

Contributions will be limited by the urban condition of the project. A tree retention plan will be provided which will identify all trees for retention and replacement. All existing trees are retained.



Landscape Plan

Provision of planting for passive shading is contingent upon limited site area and priorities on roof top spaces for daycare play space and other social programming.

Solar Shading

The balconies provide solar shading to the punched windows below during the summer season while allowing desirable heat gain from the lower sun in the winter months.

Envelope First Approach

A robust thermal envelope will be the foundation for achieving substantial energy savings while achieving a high degree of thermal comfort within the building. In a departure from contemporary practice in Vancouver, the project will use an appropriate window to wall ratio of approximately 45%, with punched windows rather than curtainwall. The façade will be made up of stone cladding over continuous exterior insulation.

Heat island effects will be mitigated through vegetated and high albedo roofing materials. The solid limestone cladding panels provide inherently reflective surfaces and slow release of moisture, which will cool the air rising adjacent to the surface.

Energy Performance

The project will achieve, at a minimum, energy performance in excess of requirements. Energy modelling will account for thermal bridging. The project will take an "envelope first" approach. Strategies under consideration include:

- High performance, punched windows rather than extensive curtainwall glazing
- Exemplary air-tight, conditioned space in construction with a continuous air barrier encompassing the entire thermal envelope and careful attention to connections and penetrations.
- Substantial continuous exterior insulation
- Mitigation of thermal bridging with careful attention to details including isolating or insulating balconies
- Passive House trades training
- LED lighting throughout
- High efficiency mechanical systems
- High efficiency appliances
- Earth Tubes are proposed to provide pre-conditioning of fresh air

Leadership

As outlined above, the project takes an "envelope first" approach to energy performance in keeping with the direction of the City of Vancouver Zero Emissions Building policy and Passive House Principles. The project will demonstrate strategies that are not yet common

but are expected to be utilized as development responds to the new metrics the city has brought forth. The development proposes a case study to share strategies and lessons learned with other high performance projects targeting low greenhouse gas emissions.

Transportation

- 100% of suites have access to full 40 Amp level 2 electrical vehicle charging
- Exemplary bicycle infrastructure
    - End of trip facilities for daycare staff
    - Bicycle repair room for residents
    - Designed to make cycling an easy choice with bike parking close to grade

Waste Management

A waste management concierge will serve residents, picking up waste from each floor/suite and ensure it is sorted into different collection streams for reuse, recycling, composting, and garbage. A dedicated location on each floor is provided for this function.

Social Sustainability and Connectivity

The project will engage the Blade Runner program during construction. This initiative supports disadvantaged populations develop transferable skills in the construction industry.

Design for interactivity and social integration with shared circulation spaces and amenities between the different building programs (condos, rental, daycare). This could include a workshop space, games room or coffee station in the lobby.

Passive Design

Passive Design will be key to achieving substantial energy savings while achieving a high degree of thermal comfort within the building.

In a departure from contemporary practice in Vancouver, the project will use an appropriate window to wall ratio with punched windows rather than curtainwall. Stone cladding over continuous exterior insulation. Windows will be operable and many units will have cross ventilation opportunities.

The project will aim to achieve or exceed direct lines of sight to the outdoor environment via vision glazing between 0.76 metres and 2.3 metres above the floor level in 90% of all regularly occupied areas.

Lighting controls per ASHRAE 90.1-2010. Possibly motion sensors within suites.

Parkade will be painted white to reduce lighting energy.

Access to Nature

The project will include a contribution of the westernmost 20' of the project block to a future park. The new park will replace Nicola Street from Alberni to the lane.

Natural play areas will be considered as part of daycare outdoor design. Additional measures may include contribution to an off-site green space or habitat program. Residents will enjoy proximity and views to Coal Harbour and English Bay.

Sustainable Food Systems

Again, the dense urban site with restricted solar access allows limited opportunities for food systems. Nevertheless, focused areas of fruiting trees and edible landscape will be incorporated into the project planting palette in locations with favourable light conditions and

adequate space, along the south laneway at the daycare drop off and in planter boxes on level seven amenity terraces.

Outdoor barbeque areas will provide shared amenities for rental and condo residents. Social integration is promoted through opportunities for residents to cook and eat together.

Green Mobility

The green mobility plan will include a variety of initiatives with a focus on electric vehicle charging. All suites will have access to parking roughed in for EV charging. Additional measures under consideration:

Car share

The Developers have indicated the project is not to have a car share program, but we expect the city will want this.

Bicycling

- Electric bike charging
- Bike repair room with tools, stand
- End of trip facilities for daycare staff
- Bike share for residents managed by strata
- Provision of outdoor bike pump

The green mobility report will also describe the transit and pedestrian possibilities available to building occupants and visitors.

Zero Waste Planning

The project will focus on operations phase waste management. The

plan will include analysis of waste generation rates and strategies to encourage multiple stream collection. A "Waste Management Concierge" to help residents achieve maximum waste diversion from landfill. This person would take care to properly sort residents waste within the on-floor storage system.

Recycling rooms to be bright, friendly and well organized. They will be sized appropriately. Clear signage/graphic language will communicate what materials are accepted in each of the separate streams being collected including:

- Composting
- Recycling paper, cardboard, plastics, glass, metals, soft plastics, batteries, light bulbs, Suites will include convenient multi-stream receptacles. Residents will be educated on the waste management system and updates on waste diversion performance of the building will be available to residents
- Each residential floor has a recycling closet to facilitate recycling

Affordable Housing

The rental building currently on the site that will be removed to make way for the project. However, the new building will include an equal number of market rental suites.

By meeting or exceeding the CoV requirement for 35% two and three bedroom suites within the market & rental housing, there be a significant increase in family oriented suite mix.

Low Carbon Energy Supply

The West End Rezoning policy section 5.1 states: "New developments in the West End shall be designed to include a hydronic heating system in order to easily connect to a neighbourhood energy system when one becomes available."

The project has the ambitious energy performance goal of meeting the Passive House standard, improving upon the TEDI, EUI and GHG requirements of the Green Buildings Policy for Rezonings under the Zero Emissions Building Plan.

Achieving this level of performance will dramatically reduce operational energy consumption and carbom emissions. The building will be so energy efficient that it does not make a good candidate for connection to district energy, as has been established with other high performance projects in Vancouver.