VALLEYVIEW TOWN HALL
Ultra-Low-Energy Building

Oscar Flechas Architect, AAA AIBC CPHD MRAIC LEED®AP
INTRODUCTION

Oscar Flechas *Architect, AAA AIBC CPHD MRAIC LEED®AP*

- Architect with more than 20 years of experience
- Registered in AB and BC
- Certified Passive House Designer
- First PH renovation project in Vancouver (2010)
- A few commercial projects applying the standard
- First Commercial Passive House Building in Alberta and first Passive House Plus Building in the world?
- President Passive House Alberta
OVERVIEW

- Town of Valleyview - Procurement process
- Five Principles of Design and Construction - Valleyview case study
- Closing Remarks
- Questions
PROCUREMENT PROCESS
PROCUREMENT

- Decision based on a Building Condition Assessment of their existing building. The report indicated that it would be worthwhile to invest in a new building.

- Town engaged architect, mechanical and electrical consultants to prepare and RFQ and RFP.

- Selection of Design-Builder
THE PROGRAM

- 800 square meter, two-storey building with basement, and includes offices, meeting rooms, and other support spaces.
- Meeting the rigorous energy efficiency goals and certifications of the Passive House Institute (PHI) or PHI US (PHIUS)
RFQ

- Team
  - organization and experience
  - Design development experience
  - Design-Build experience
  - Passive House Design and Construction experience
  - Capacity to undertake the work
- Overall strength and relevant experience and ability to undertake the design and construction of the Project
- Financial capacity
RFP - PROJECT DELIVERY

- Approach
- Organization
- Preliminary Project Schedule
- Quality Assurance
- Design Principles (50%)
RFP - DESIGN

- Site Development and Civil
- Architectural and Structural
- Mechanical
- Electrical
- Passive House and Sustainability - PHIUS (7 out of 15 points)
- Provision for future expansion
RFP - FINANCIAL

- Lowest Price
- Weighting system
  - Higher prices are assigned points by percentage difference
RFP - PROPOSAL

- Passive House Classic Certification through the Passive House Institute (PHI)
- Implement slight design and scope changes to Owner’s preliminary package
RFP - PROPOSAL
RFP - PROPOSAL

SHADOWS

- Overhang protects openings
- Overhang protects lower openings
- No protection

ENERGY

- Indicative Design - 18.67
- No overhangs - 17.34
- Full face no overhangs (exterior area) - 16.73
- New proposal (retain shapes, smaller overhangs) - 17.89

FLECHAS architecture
RFP - PROPOSAL

- Integration of the main building entrance vestibule, street, and public plaza.
- Optimal window re-configuration
- Window-specific shading devices and reduced overhangs
- Use of certified components
FIVE PRINCIPLES
VALLEYVIEW CASE STUDY

SOURCE: Google Maps
VALLEYVIEW CASE STUDY
VALLEYVIEW CASE STUDY
VALLEYVIEW CASE STUDY
VALLEYVIEW CASE STUDY
VALLEYVIEW CASE STUDY
FIVE PRINCIPLES

- Insulation
- Airtightness
- Thermal bridge-free
- Windows and doors
- Mechanical ventilation
FIVE PRINCIPLES - INSULATION

Insulation
INSULATION - R VALUES
INSULATION - CONSTRUCTION

• Foundation Detail
INSULATION - CONSTRUCTION

• Details
INSULATION - CONSTRUCTION

• Foundation Detail
INSULATION - CONSTRUCTION

• Foundation Detail
INSULATION - CONSTRUCTION

• Foundation Detail
INSULATION - CONSTRUCTION

- Foundation @ Floor Detail
INSULATION - CONSTRUCTION

- Foundation @ Floor Detail
INSULATION - CONSTRUCTION

• Foundation @ Floor Detail
INSULATION - CONSTRUCTION

• Foundation @ Floor Detail
INSULATION - CONSTRUCTION

• Wall and Floor Detail
INSULATION - CONSTRUCTION
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• Wall and Floor Detail
INSULATION - CONSTRUCTION
FIVE PRINCIPLES - AIRTIGHTNESS

Airtightness
AIRTIGHTNESS - ACH

3.2 ACH @50
2.5 ACH @50

PH
0.6 ACH @50
ONE airtight layer all around the building
AIRTIGHTNESS - CONSTRUCTION
AIRTIGHTNESS - CONSTRUCTION
Attention to Detailing is Critical
AIRTIGHTNESS - DETAILS

Attention to Detailing is Critical
FIVE PRINCIPLES - THERMAL BRIDGE-FREE

Thermal Bridge - Free
THERMAL BRIDGE-FREE - DESIGN
THERMAL BRIDGE-FREE - CONSTRUCTION
THERMAL BRIDGE-FREE - CONSTRUCTION
THERMAL BRIDGE-FREE - CONSTRUCTION
THERMAL BRIDGE-FREE - CONSTRUCTION
FIVE PRINCIPLES - WINDOWS AND DOORS

Windows and Doors
WINDOWS AND DOORS

ABC1 NECB
R=3.54

PH
R=8.73
WINDOWS AND DOORS
WINDOWS AND DOORS - CONSTRUCTION
WINDOWS AND DOORS - CONSTRUCTION

• Membranes and Shims
WINDOWS AND DOORS - CONSTRUCTION

- Expanding tape
WINDOWS AND DOORS - CONSTRUCTION

• Attachment and Levelling
WINDOWS AND DOORS - CONSTRUCTION

- Interior tape and Exterior insulation
WINDOWS AND DOORS

○ COMMERCIAL DOOR
  • ADA Sill
  • Card Reader
  • Automatic operator
  • $$$
FIVE PRINCIPLES - MECHANICAL VENTILATION

Mechanical Ventilation
MECHANICAL VENTILATION
MECHANICAL VENTILATION - DESIGN

• The building ventilation system will be provided with a high efficiency Energy Recovery Ventilator (ERV)
MECHANICAL VENTILATION - DESIGN

- Building heated and cooled primarily with an air source heat pump system that feeds a series of fan coils
MECHANICAL VENTILATION - DESIGN

- When the interior of the heat pump room nears -20°C, outdoor air louvers close and the condenser will recirculate indoor air.
- An electric unit heater will heat the space to maintain system operation
CLOSING REMARKS
CLOSING REMARKS - LEADERSHIP
### Specific building characteristics with reference to the treated floor area

<table>
<thead>
<tr>
<th>Treated floor area m²</th>
<th>601.9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Space heating</strong></td>
<td></td>
</tr>
<tr>
<td>Heating demand kWh/(m²a)</td>
<td>12.92 ≤ 15</td>
</tr>
<tr>
<td>Heating load W/m²</td>
<td>15</td>
</tr>
<tr>
<td><strong>Space cooling</strong></td>
<td></td>
</tr>
<tr>
<td>Cooling &amp; dehum. demand kWh/(m²a)</td>
<td>0 ≤ 15</td>
</tr>
<tr>
<td>Cooling load W/m²</td>
<td>0</td>
</tr>
<tr>
<td>Frequency of overheating (&gt; 25 °C) %</td>
<td>- ≤ 10</td>
</tr>
<tr>
<td>Frequency excessively high humidity (&gt; 12 g/kg) %</td>
<td>0 ≤ -</td>
</tr>
<tr>
<td>Airtightness</td>
<td>0.6 ≤ 0.6</td>
</tr>
<tr>
<td>Non-renewable Primary Energy (PE) PE demand kWh/(m²a)</td>
<td>111.61</td>
</tr>
<tr>
<td><strong>Primary Energy Renewable (PER)</strong></td>
<td></td>
</tr>
<tr>
<td>PER demand kWh/(m²a)</td>
<td>47 ≤ 45 47</td>
</tr>
<tr>
<td>Generation of renewable energy (in relation to consumed building) kWh/(m²a)</td>
<td>100 ≤ 60 64</td>
</tr>
</tbody>
</table>

Fulfilled?

- Space heating: yes
- Space cooling: yes
- Frequency of overheating: yes
- Frequency excessively high humidity: yes
- Airtightness: yes
- Non-renewable Primary Energy (PE): no requirement
- Primary Energy Renewable (PER): yes

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I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

Task: .................................................................
First name: ...........................................................
Surname: ............................................................

Passive House Plus?: yes

Signature: ...........................................................
PASSIVE HOUSE PLUS - VALLEYVIEW TOWNHALL
DEFINITION - PH CLASSES

- **Premium**: Renewable energy generation \(\geq 120\) kWh\(_{PER}/\)m\(^2\)ground\(\cdot a\)
- **Plus**: Renewable energy generation \(\geq 60\)
- **Classic**: Renewable energy generation

- **≤ 30**: Renewable primary energy demand \(\leq 45\) kWh\(_{PER}/\)m\(^2\)TFA\(\cdot a\)
- **≤ 60**: \(\leq 60\)

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Certified Retrofit
Passive House Institute

EnerPHit

Low Energy Building

© FLECHAS architecture
QUESTIONS

Oscar Flechas
Architect, AAA AIBC CPHD MRAIC LEED®AP
oscar@flechas.ca
www.flechas.ca

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THANK YOU QUESTIONS?