

Innovative Solutions for Mid-rise Residential Passive House Wood Structure

Jermyn Wong

Associated Engineering, Burnaby, BC, Canada

Contact: wongj@ae.ca

Abstract

The SFU Passivhaus is a proposed residential project that will target Passive House certification. It comprises two mid-rise wood frame buildings, one of which is located on top of a concrete parkade. Key challenges include the mitigation of vertical shrinkage effects for the wood structure, and the need for a super-insulated envelope around each of the residential structures. A number of innovative solutions are being considered, including the use of engineered wood components to reduce the anticipated shrinkage, detailing of components to accommodate vertical movement, and a base isolation concept that helps maintain the continuity of the thermal envelope at the interface with the concrete parkade. At this time, the project is still in design development phase, so the solutions are only presented and discussed at a preliminary concept level, without significant numerical data or analysis.

Keywords: mid-rise wood building; passive house; wood frame; wood shrinkage; engineered wood; base isolation

1 Introduction

Situated on the SFU Burnaby campus, the proposed SFU Passivhaus will house over 80 affordable rental apartments. It comprises a five-storey wood frame building on a concrete parkade, and a six-storey wood frame building. It will be the first residential project of this scale in Canada to target Passive House Certification, meaning that it will be designed to meet the highest expectations for energy efficiency. A building designed using passive house principles can provide year-round comfort, but with minimal energy use in heating or cooling.

The passive house fundamentals to energy conservation that are considered in this project include:

- A super-insulated building envelope¹
- Continuous air barrier¹ to minimize leakage
- High performance windows¹
- Engineering and detailing of connections details to minimize thermal bridging¹
- A heat-recovery ventilation system¹ to improve indoor air quality
- Canopies and other structures that are thermally separated from the building envelope
- Sunshades that help prevent overheating in the summer

The project is currently in design development phase. The preliminary plans and sections are shown below: