Notice of the Final Oral Examination
for the Degree of Master of Applied Science

of

ERIC WILSON

BEng (University of Victoria, 2015)

“A Reality Based Cost-benefit Analysis of High Performance Residences in Victoria, BC”

Department of Civil Engineering

Tuesday, April 17, 2018
10:00 A.M.
Engineering and Computer Science Building
Room 467

Supervisory Committee:
Dr. Phalguni Mukhopadhaya, Department of Civil Engineering, University of Victoria (Supervisor)
Dr. Min Sun, Department of Civil Engineering, UVic (Member)

External Examiner:
Dr. Ajith Rao, Senior Researcher, USG Corporation

Chair of Oral Examination:
Dr. Robert Gifford, Department of Psychology, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies
This research initiative attempts to empirically determine, with reality-based evidence from un-biased sources, the cost disadvantage, energy advantage, and expected pay-back period associated with building an above-code residence in Victoria, BC. In addition, this initiative created a much-needed benchmark for contractors to gain a firm understanding of the construction details required to achieve the various levels of the “Step-Code” in the newest edition of the BCBC. It was important to gain this information specific to Victoria B.C. to make an appropriate estimation of the actual “cost challenge” for building above code in the local housing market. This was accomplished through: a simulated tendering process with local contractors, an energy analysis of a case-study residence with the same floor plan, and an in-depth study into the variables governing time-to-amortization. The contractors provided quotes for an “above code” residence (ACR), and a minimum-code residence (MCR) with the same floor plan. The results were then compared to the as-built construction costs of the residence. When compared to the MCR, it was found that the ACR has a cost-disadvantage of approximately 22.5%, an energy advantage of 22.5 kWh/m²/yr, and a payback period of over 79 years when a fuel inflation rate of 2% is considered. However, many of the components in the ACR assemblies were either for aesthetic appeal (metal-roofing), or comfort (floorcavity insulation), and therefore it was possible to reduce the cost-disadvantage to just 2.1%, while maintaining an energy advantage of 15kWh/m²/yr and step-level 3 designation. This was dubbed the hybrid-residence (HR) as it employed a combination of above-code and minimum-code construction assemblies. The HR has a pay-back period of approximately 16 years when the same inflation rate is expected in the price of fuel.