## **CIV-E3010 - Applied Building Physics and Design**



Figure 1. Overview of the newly renovated house

Suppose you work as a consultant and your clients would like to consult you the following problems regarding the new house design (see Figure 1). Provide your solutions for the problems:

1. What are the factors affecting human thermal comfort and what are the PMV and PPD models for?

2. The house is located at an excellent air quality place. For a conference room with floor area  $230m^2$  and volume  $575m^3$ , the occupant density is  $0.3/m^2$  and the polluting emission from furniture 0.2 olf/m<sup>2</sup>. Without smoking (say 1 olf/person). What is the required ventilation rate for comfort if the perceived indoor air quality IAQ belongs to category C and ventilation effectiveness is 0.5.

3. The thermal capacity of the room is 5GJ/°C, and the heat loss rate is 45kW/°C. Without any incidental gain, estimate the indoor temperature every two hours from 4am to 8am.

Outdoor Temperature		Indoor
		Temperature
4am	2	20
6am	3	
8am	5	

4. Explain how this could happen: in an early morning in winter, condensation occurs on the newly installed window's interior surface, yet, such condensation hadn't happened in the old window before the house was renovated.

5. To prevent moisture problems, what do you check in performing quick home inspections? List at least four items and provide your justifications (refer to Figure 1).