

Kitsilano Duplex Passive House Retrofit / EnerPHit

Our Kitsilano Duplex EnerPHit project is one of very few certified enerPHit projects in Canada. The goal of this project was to turn a 1930s single family home in the heart of Kitsilano, Vancouver into a certified Passive House Duplex via the enerPHit standards. The home has been owned by the same family since the 1950s and has recently been gifted down to the grandson and granddaughter of the original owner. They have decided to not only split the house into a duplex so that they could each have half of the house, but they wanted to go the extra mile to renovate it to Passive House standards as well. Most of Kitsilano is zoned as character retention lots which makes upgrading thermal performance very challenging while maintaining the local architectural heritage. This was our biggest challenge with this project but we have succeeded with flying colours as passed our final blower door test with a score of 0.33ACH.

This project JUST finished so professional photos will be taken within the next month



1. Strategic Decisions

This project is a certified enerPHit duplex that has been converted from a 1940s single family home. By renovating this house instead of tearing it down and building new, we were able to maintain more than 60% of the original framing material which would have otherwise ended up in the landfill. We have also installed a 46 panel PV system on the roof which we have not fully completed the calculations on but will likely bring this house to net zero

standards or beyond. We had to lift the house to install a new crawl space basement which acts as a mechanical room and storage space.



2. Community

This house sits within an RT6 zone in Vancouver which is a character retention zone. This challenge was viewed as an opportunity to showcase that deep energy retrofits are possible on character retention projects. I think this holds a lot of community value as it shows that we can upgrade the energy performance of the canadian housing stock without losing architectural character and without seeing all old houses end up in the landfill. The site has 1 parking space for each unit and will each have an electric car charging station.

3. Site ecology

No water needs to be pumped off this site and we have planted 3 trees on the property to keep Vancouver a green and vegetated city!

4.

5. Wellness

We have installed a highly efficient HRV system that is 94% efficient at retaining room temperature. We have also installed a MERV 15 filter system on the HRV to continually filter the indoor air and maintain optimal indoor air quality. This has become increasingly important with the emergence of the COVID 19 pandemic as well as the increased forest fire smoke that has been present in BC because of climate change.

6.

7. Operating Energy Present and Future

This duplex is fully electric with electric heating and hot water. We have also roughed for air to air heat pumps for space cooling if needed. We did this as summers in Vancouver are increasingly heating up and space cooling might become a necessity for comfort in any building. Our duplex is expected to use approx 14 kWh per square meter per year and is certified passive. We have installed triple pane passive certified wood windows and our wall assembly is 2x6 framing with 4" of exterior mineral wool. Thermal comfort will be easily maintained as our blower door test showed that we have only 0.33ACH of leakage.



8. Materials and Resources

Because this project was a large-scale renovation, where most projects of this scale would be full demolition to build new, we have been able to save about 60% of the framing material from the existing structure. This dramatically lowers our embodied carbon through needing far less new material and reduces the amount of construction waste heading to the landfill. We have also installed a concrete free basement slab, constructed with 2 layers of $\frac{5}{8}$ " plywood to minimize the embodied carbon in the slab.



9. Building Life Cycle Considerations

As I have mentioned in other categories, by maintaining a large percentage of the structure of the original 1940s house, we were able to extend the life cycle of the old douglas fir wood

that was used for framing back when the house was first built. By adding additional structure to the old framing, we were able to bring the house up to today's standards structurally and seismically while using far less new wood than in a new home build. Adding onto this, I believe that building to passive house standards is ensuring that this house will stand the test of time and perform as it does today for another 50-100 years. We can now expect this 1940s house to live well into the future, perhaps even another century.

10. Education and Information Sharing

I think this house can show the building community that we do not have to tear down old houses to make room for new more energy efficient houses. We can achieve the same standards and targets by doing deep energy retrofits on old character homes.