



The Reach Guesthouse

## FORM 1 Project Description

### Project Summary (200 words)

Originally a four bedroom, one-bathroom house, this 19th century farmhouse was renovated to a two-bedroom, two-bathroom house incorporating Passive House EnerPHit standards.

Conceptually, a new insulated, airtight structure was built over the existing post and beam house.

The rear of the building was substantially rebuilt to accommodate a large, double height modern size kitchen, dining and living space. The new front gable window was intentionally oversized, allowing a glimpsing view of the original arched front gable window within.

The house will serve a guesthouse for a future great house on the same property. In the interim, it serves as a vacation property for visitors to Prince Edward County.

The original post and beam building was exposed and meticulously cleaned and sealed inside an airtight envelope. Structural Insulated Panels were used as a new building envelope, providing a continuous R43 insulation value in the walls. New roof trusses were added to the existing structure, surmounting the existing roof and walls. This allowed for a 600mm cavity to be filled with new cellulose insulation, providing a continuous insulating value of R67.

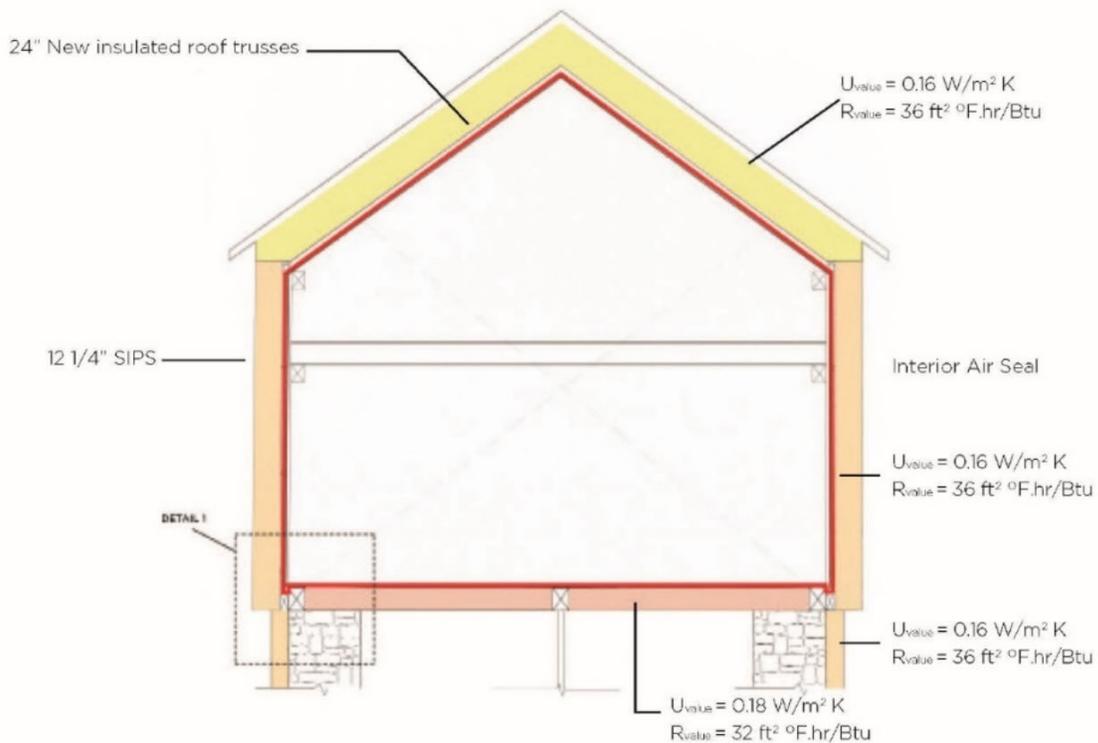
To achieve an airtight seal, all ground level floorboards were lifted, with an Oriented Strand Board installed before the floorboards were re-laid.

## MAIN PROJECT DESCRIPTION

### 1. Strategic Decisions (94 words)

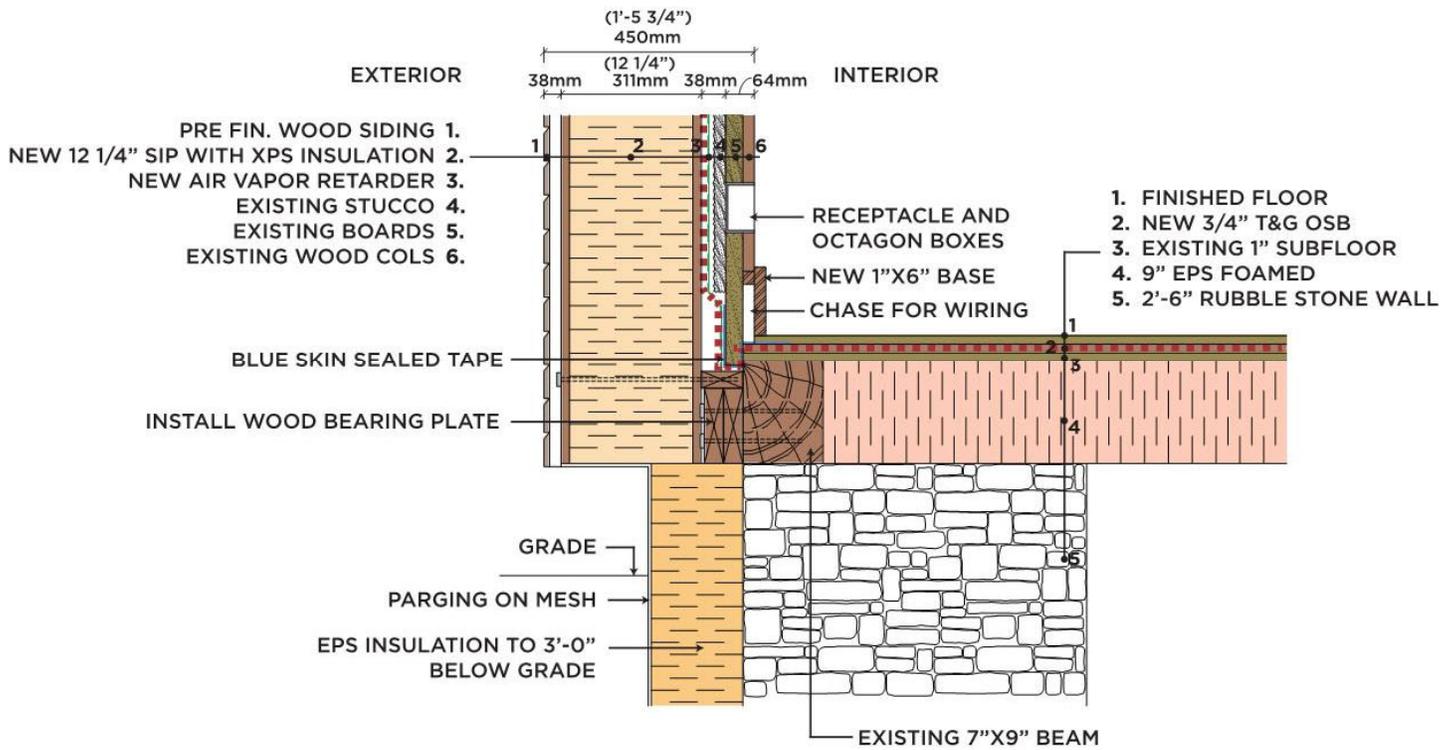
As the building was clearly fixed in its orientation, the intentions of the final design was to maintain the proportions of the original home. With no original drawings of the house, this created a voyage of discovery as the entire interior and exterior was stripped back one layer at a time. The original structure was not insulated to modern or Passive House standards and creating many thermal bridges. The house's poor thermal performance combined with an old out of square structure, made building a house around the house was the best option for retrofit.

#### INTERIOR AIR SEAL



DETAIL 1: TYPICAL WALL SECTION

SECTION DETAIL



## **2. Community (100 words)**

Situated in one of the most desirable areas of Prince Edward County (PEC), The Reach Guesthouse serves as short term rental for those who want to explore the County. It encourages community interaction and supports the PEC community by drawing tourism and business to the area. The County is well known for its vineyards, orchards and proximity to waterfront.

With easy access to nature trails, visitors can explore the area by foot or bicycle.

Local residents were very impressed to see a derelict house—most likely headed for demolition—brought back to life and established as a beacon of sustainability.

**3. Site Ecology (73 words)**

The guesthouse sits on a 10-acre private double lot with direct access to a nature trail that leads to 800 feet of waterfront. A woodland trail has been groomed and slowly descends to access a new 16' x 30' wood deck at the water's edge.

A block of native vegetation has been planted at the road frontage of the house to enhance privacy. No significant changes have been made to the existing ecosystem.



Side view of house.



Close up of front porch.



Exterior deck.

#### 4. Light and Air (95 words)

All areas (100%) of this small house are within 7 metres of an operable window. Windows are also strategically located on opposite sides of the house to enable cross ventilation. A Passive House Institute Certified ERV (Jablotron Futura) is used to provide fresh air 24/7 to the house, while recovering heat from exhausted air with exceptional efficiency.

Energy star rated appliances and LED lightbulbs are used throughout the house. The efficiency of the ERV, coupled with the airtight envelope and significantly improved thermal envelope, creates an exceptionally efficient building using far less energy for operations.



Rear view of house.



Interior of kitchen with triple glaze windows.

## 5. Wellness (101 words)

The Reach Guesthouse serves as an escape from the hustle and bustle of daily life. Occupants can sit on the private deck and immerse themselves in the 10-acre scenery with views of Adolphus Reach. There is easy access to the waterfront and nature trails for hiking and other outdoor activities.

With a focus on occupant comfort, the Passive House standard promotes exceptional indoor air quality and consistent indoor temperatures. Inside the house, occupants always comment on the delightful smell of wood and on the calming quietness, if not, silence of the interior. Both factors contribute to the health of the occupants.



Living room area.

## **6. Water Conservation (79 words)**

The main source of water is through a well system. It was renovated, cleaned and provides a trickle feed to an existing 1000 GAL cistern under the house. Water is pumped to fixtures into the house at a higher pressure, as needed.

To calculate water savings, we compared ASHRAE quantities for a full time dwelling with Passive House use rates accommodating rental usage patterns. This combined with occupant education, we anticipate a reduction in water consumption of approximately 40%.

## **7. Energy Present and Future (216 words)**

Heating and cooling are supplied to the house from a centrally located Mitsubishi ductless mini-split system. In the heating season, the house is mostly used on weekends and the only constant internal heat gain is a kitchen fridge. Throughout the year, the primary energy use will still be small, occasionally seeing heating peaks throughout the cooler season from the varying occupancy rates. The projected annual energy consumption, when the house is used as a vacation rental, is 181kWh/m<sup>2</sup>.

Energy savings/reduction calculations were done using the Passive House energy model. Using conventional R-values for the walls, roof, floor we were able to compare the existing envelope to the new assemblies which meet Passive House standards for the project climate. This modeling demonstrated an energy reduction of 85% for the project.

The house's orientation on site was locked in place, creating some challenges to allow for passive strategies. As part of the renovation design work, additional glazing was added to the rear of the house creating the opportunity for solar heat gain. The new windows for the project are all glazed to offer increased thermal performance, assisting in overall occupant comfort.

This resilient building allows for all heating to be provided by means of electricity, with significant savings on operation costs and removing a reliance on fossil fuels.



Premanufactured modular roof installation.



## 8. Materials and Resources (83 words)

The interior was stripped down to the wood structure and sandblasted to create a stunning, warm, wooden interior. The round vents and concealment of the ductwork from the ventilation system are the only new touches in the old wood walls.

Approximately 65% of the materials used during the renovation were from recycled material. We were able to recycle 70% of waste materials during construction. The original lath was saved from the interior demolition and then cleaned and re-used as an interior wall finish.



Interior view of upper floor.

## 9. Building Life Cycle Considerations (65 words)

The house was abandoned and neglected for a number of years before the current owners purchased the property.

Careful attention was given to preserve the wood structure of the building and maintain the home's rustic charm. The project is the resurrection of a dilapidated house into a stunningly beautiful home that's functional, comfortable, healthy, energy efficient and resilient and will hopefully last another 200 years.



Existing house prior to renovation.

## 10. Education and Information Sharing (76 words)

This project was a journey for the team with valuable lessons learned. It might have been cheaper and quicker to start from scratch, but the owners saw the potential in preserving the charm of the farmhouse while incorporating a Passive House design methodology.

The end result is an architectural re-interpretation. Newly acquired knowledge from lessons learned have been applied to future projects on the site including a great house which is planned on the same property.