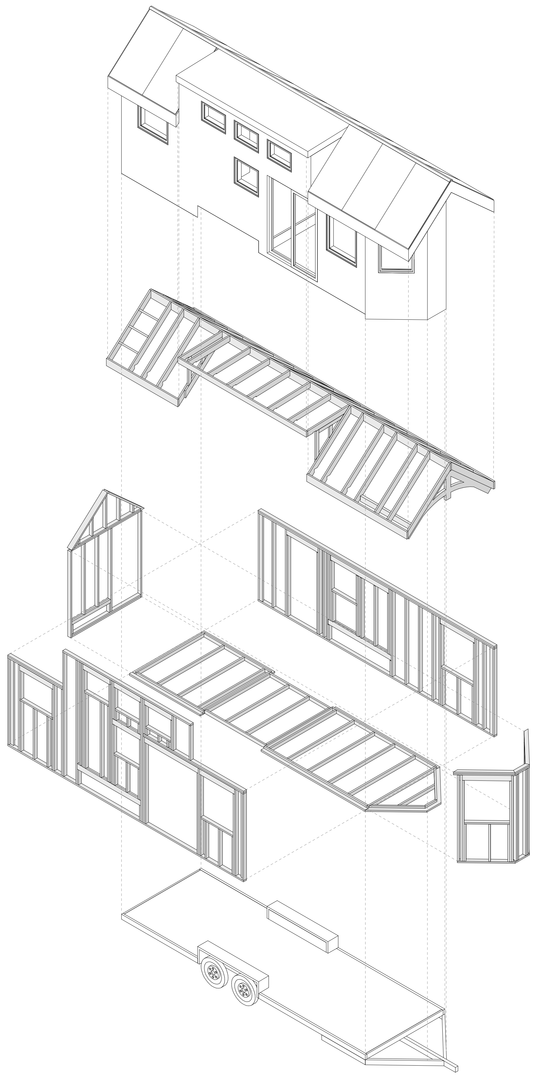
Northern Nomad

A NET-ZERO ENERGY AND WATER STUDENT DESIGN BUILD

The **Northern Nomad** is a tiny house born from the collaborative efforts of Carleton architecture and engineering students. Under the supervision of Scott Bucking, Assistant Professor cross-appointed in both the Department of Civil Engineering and Azrieli School of Architecture and Urbanism, the conceptualization of the project began as the fourth-year capstone project of five Architectural Conservation and Sustainability Engineering students in the fall of 2016. The current team consists of nine students, each with their own focusses and skills, that have made the project become a reality this summer. As of September 2017, the house nears the end of its construction phase under the Architecture Building canopy and moves towards its instrumentation phase.

Despite its small footprint of 220 square feet, the tiny house will achieve net-zero energy. On site, the home will generate enough renewable energy annually to meet or even exceed its energy needs by using roof-mounted solar panels, Tesla lithium ion batteries, and a heat pump to provide heating and cooling to the interior spaces. Surplus energy will be used for water collection and treatment or will be stored in the batteries for later use during periods of lower energy generation. The house will collect water by dehumidifying the outside air; the pure water harvested from the air will be stored in rainwater tanks concealed under a raised floor and will satisfy potable water needs. The Northern Nomad's focus on energy and water is a unique feature in cold-climate applications.

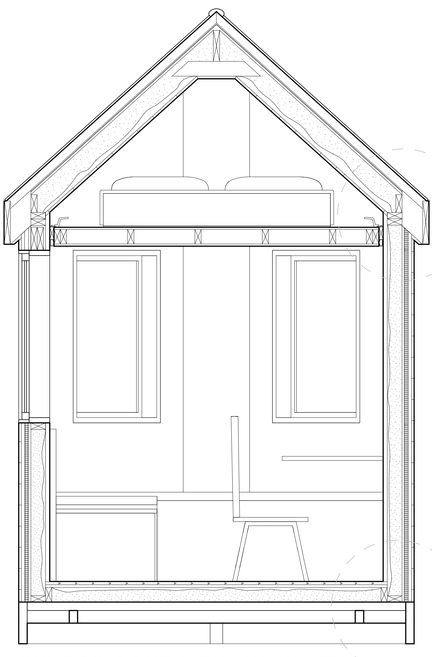
The Northern Nomad will remain on Carleton's campus for a period of one year. It will be open for public viewing at Green Energy Doors Open Ottawa on September 30, 2017. Furthermore, it will be used by engineering students to experimentally validate if the home will achieve its net-zero energy goals in Ottawa's climate. It will also allow students to apply and develop skills learned in the classroom to an urgent real-world matter.



STRUCTURAL EXPLODED AXONOMETRIC (RIGHT): THE HOUSE WAS CONSTRUCTED USING 2"x4" LUMBER FOR FLOORS AND WALLS; THE ROOF EMPLOYS 2"x6" RAFTERS AT 42 AND 3 DEGREE SLOPES.

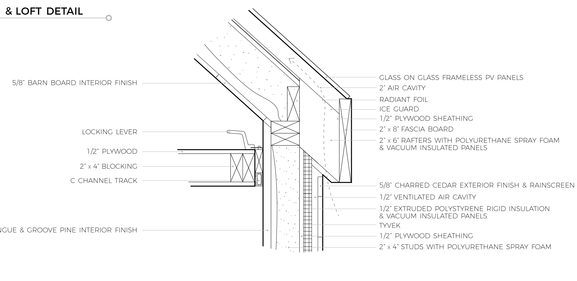
THE OVERHEAD LOFT CAN SLIDE ALONG HORIZONTAL TRACKS IN ORDER TO ADAPT TO DIFFERENT USES OF THE INTERIOR SPACE.

TINY HOUSE LIVING TAKES ADVANTAGE OF OUTDOOR SPACE, EMPHASIZED BY THE LARGE GLASS SLIDING DOOR.

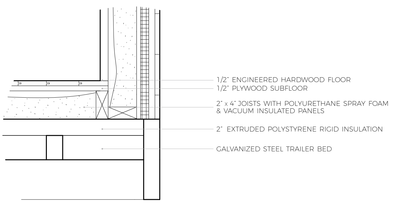


CROSS SECTION: THE LOFT PLATFORM PROVIDES LATERAL RESTRAINT AND FLEXIBILITY IN THE USAGE OF THE INTERIOR SPACE. IT CAN BE MOVED HORIZONTALLY ACROSS THE ROOM AND LOCKS INTO PLACE WHEN USED FOR SLEEPING.

ROOF, WALL, & LOFT DETAIL



WALL, FLOOR, & TRAILER DETAIL



SPRAY FOAM: R5.9/IN
EXTRUDED POLYSTYRENE RIGID INSULATION: R5/IN
VACUUM INSULATED PANELS: R177/IN

WALL R-VALUE: R37
ROOF R-VALUE: R32
FLOOR R-VALUE: R51

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