

NEST ZERO

Wentworth Institute of Technology
BOSTON, MA

Project Summary


Massachusetts' historical town of Plymouth set the standard for the new world as English pilgrims settled back in 1620. Today, the project's goal is to set a new standard for the new world in sustainable building practice. Wentworth Institute of Technology's team, NEST ZERO developed an ad-reno project, hopefully serving as a new building typology for the town of Plymouth's fight against the home shortage epidemic. The prototype features passive and active systems retrofitted to three existing fisherman shanties that reside on the shoreline of the town. Combined, the three shanties provide 1440 square feet for an unhoused family of three, the Morgan family. The family, a fisherman, Mr. Morgan, and an artist, Ms. Morgan, and their daughter create a unique set of programs not only for those who reside within the house but the town as a whole.

Design Strategy

With the town already having plans for the shanties to be repurposed as an artist retreat, bird watching sanctuary, or shelter for the unhoused, the program attempts to feature aspects from all three. However, two of the three fisherman shanties are in disrepair, and another burnt down by an arsonist. The goal was to salvage whatever materials available and repurpose them around the new proposed structure. Keeping the relative proportions to the original fisherman shanties, new materials are only featured tastefully where the connections are made beneath the canopy. The passive systems incorporated into the house aid in either providing 100% for the family or at the very least reduce the load on the spec'd appliances.

A dining room acting as a flex-space, is featured in the core of the building doubling as an art gallery that can be closed off with curtains from the rest of the building when residents decide to open it to the public. With glazing on either side providing natural daylighting and views, the canopy drapes over the building, between the two shanties furthest to the front of the property. A shed, doubling as a workshop provides program for the third shanty as well as creating a courtyard in the back of the house. The tower, inspired by lighthouses popular in the area, is a space strictly for the daughter of the family, where her first house can be one worth remembering. The project not only aims to provide adequate necessities to be considered net-zero but also provide a more than adequate living conditions.



Map of Plymouth : 1-3500 



Project Data

- > **Site Location:** Plymouth, Massachusetts
- > **Climate Zone:** 5A
- > **Program:** 2 bed, 1 bath
- > **Square Footage:** 1440 ft²

Proposed Technical Specifications

- > **Proposed Wall R-Value:** 52.6
- > **Proposed Roof R-Value:** 68
- > **HVAC System:** Air Source Heat Pump
- > **PV Array Square Footage:** 500 ft²
- > **HERS Rating w/o PV:** **32**
- > **HERS Rating w/ PV:** **-18**



PROJECT HIGHLIGHTS

NEST ZERO
Plymouth, Massachusetts

Site

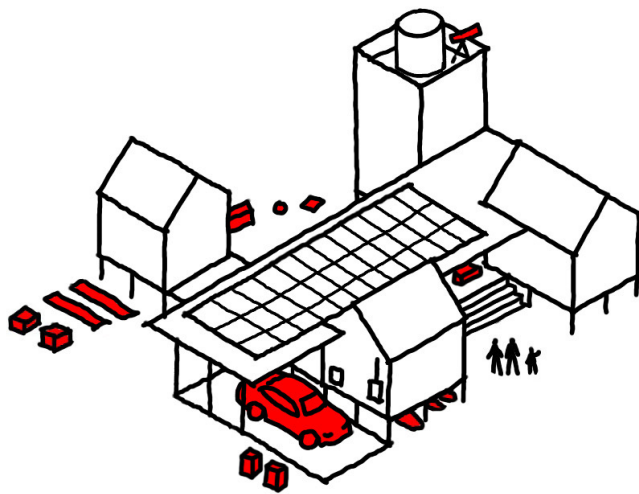
The site is located along Warren Avenue between Plymouth Beach and the Eel River. It was previously used to sell seafood and to store fishing equipment. After years of being abandoned, the shanties are in very poor condition.

Due to the site's proximity to the ocean, it experiences harsh coastal storms and occasional flooding. Plymouth's climate is characterized by cold winters and hot-humid summers with year-round precipitation. The design of the house responds to the site and weather conditions to create a comfortable, resilient, and efficient home.



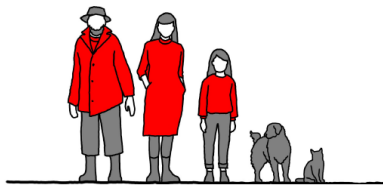
Project Design

A dining room acting as a flex-space is featured in the core of the building. It doubles as an art gallery that can be closed off with curtains from the rest of the building when residents decide to open it to the public. The left side of the building has a covered patio which serves as a semi-public place, where the family can welcome guests into their kitchen for dinner parties. The opposing side of the building is far more private with two bedrooms and a bathroom. The child's bedroom contains a second floor with an office overlooking the ocean. Beyond the central core of the building is a court yard, with each side of the new home acting as a barrier of privacy for backyard parties and cookouts.



Climate Conscious Design

With a town as eager for sustainable design as Plymouth it was exciting to implement various numbers of passive and active systems to help aid in the building's functions. Featuring a scoop vent on the bottom side of the building, the lifted structure allows the house to bring in the cold air from the waterfront. With operable windows on the top of the façade, hot air is ventilated out of the building. Paired with a water collection and filtration system as well as sufficient square footage of photovoltaics, the building is one hundred percent sufficient, ready for the Morgan family to move in.



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