



## Project Indy: Infill Reimagined Nest - Near East Side Team

### 225 North Oxford Street Home

#### Project Summary

225 North Oxford St. was chosen as the Urban Single Family home site because of its array of possibilities. The site currently sits empty between 2 existing homes. Oxford Street has immediate access to E Washington Street, providing access to bus routes and immediate necessities. The parcel sits only 1 block from the local library branch and multiple community churches. Oxford Street is a residential street with large, matured trees and a community garden. Our site is an infill lot which will help repair the fabric of an intact residential street. With multiple vacant lots on Washington Street, there is great potential for future neighborhood development.



#### Design Strategies

Building codes are important as to understand the baseline practices and strategies. In this case, building codes are nowhere near sufficient. The Solar Decathlon Design Challenge requires its teams to go above and beyond by making the Department of Energy Zero Energy Read Home Requirements the standard to meet. Underneath the DOE ZERH umbrella, the EnergyStar Homes, IECC 2015, EPA Indoor airPLUS, and PV-Ready Checklist requirements must be met. The NEST team from Ball State University takes it a step further. By meeting and, in some cases, exceeding the Passive House Institute United States 2021 Prescriptive Pathway requirements, this project has reached the pinnacle of energy efficient and environmentally responsible homes. The current and potential needs of an Indianapolis single family drives the team to actively design for aging in place, providing the resources for a family to remain in their home for as long as possible and as comfortably as possible. Following the Indianapolis codes and guidelines, the team consistently pursues a design that not only refrains from harming the environment and community but aids in the creation of renewable energy. Our team aims to design an adaptable space to “age in place” that is affordable, comfortable, and appealing to an urban single family.

#### Project Data

- Englewood, Indianapolis, Indiana
- IECC Climate Zone 5A (Cold)
- 225 North Oxford Street, 46201
- 2 Bedroom, 2 Bathroom, 2 Stories, 4 occupants
- Accessory Dwelling Unit: 1 bedroom, 1 bath, 1 occupant

#### Technical Specifications

- Wall, Foundation, and Roof Insulation: R-39.6, R-20, R-73.7
- Window Performance: U-0.15, SHGC 0.22
- HVAC Specifications: VRF, ERV
- Other Technologies: LED Lighting, PV Panels

# Project Highlights

## 1. Architecture

The single family home at the address of 225 North Oxford St. incorporates an airtight envelope design that is essential for maintaining the indoor environment and facilitating its climate control. Proper orientation of the home will allow for desired views and ideal drainage. The floor plan of our home will allow for efficient use of space and connections between the indoors and outdoors. The home will have a ground floor bedroom for aging in place and an accessory dwelling unit for rental income.

## 2. Engineering

In order to reduce the varied placement of piping, we have placed all the bathrooms, kitchen appliances, and the laundry room on one side of the unit to have a more efficient delivery method. Utilizing a ductless VRF provides both heat and air conditioning by reversing the flow of refrigerant without obstructive ductwork. An energy-recovery ventilator will use the heat in the outgoing stale air to warm up the fresh air. LED lighting will be used throughout the home but ample daylighting will be available to reduce lighting loads.

## 3. Market Analysis

Our intended target market is an urban single family in the Indianapolis, Indiana area, specifically the neighborhood of Englewood. Our home will be a 2 bedroom and 2 bath design with the master suite located on the first level to accommodate for aging in place. With our design, we look to create a home that allows a couple to begin their life together, start a family, raise and nurture that family, and remain independent when the children are grown and the couple has aged. Our project layout and design is intended to provide an efficient and affordable home for the lower income population in the surrounding Englewood neighborhood.

## 4. Durability and Resilience

Our design focuses on the home's ability to endure local environmental conditions and anticipate, withstand, respond to, and recover from disruptions. To ensure this, we will utilize the strength of durable materials with a long lifespan such as CLT, metal roofing, and steel siding. This envelope will last longer with less deterioration over time. Photovoltaic energy provides power in the event of grid interruptions.

## 5. Embodied Environmental Impact

The life cycle of the urban single family home remains at the forefront of our design, using materials in our construction that are not only recycled but could be reused in the future. Our team is passionate about limiting the use of plastic insulation materials with high embodied energy and the inclusion of CLT construction. This home has been designed to comply with the PHIUS+ 2021 prescriptive pathway. This means that there is much more insulation than a typical home in the United States, resulting in a higher embodied environmental impact for insulation. Because the building has been designed to meet the PHIUS+ 2021 prescriptive pathway, the thermal insulation and high performing building envelope allows the opportunity to reach a very low site energy usage.

## 6. Integrated Performance

Increasing daylight and reducing heating & cooling cost is a major component of the design and will be achieved through the proper orientation of the home. The robust airtight envelope we include will reduce heat losses and gains, ultimately minimizing energy use.

## 7. Occupant Experience

With the proper orientation of the structure, daylighting opportunities will be increased as well as views outside of the home. The correct placement of operable windows will allow for the inclusion of natural ventilation. Our team will be creating a home with transitional spaces outside for connection with nature and neighbors. This project is a moderate smart home where the lighting, climate control, and fire/life safety will all be able to be controlled on any cellular device with a touch of a button. This will allow for easy access for any age of occupant within the residence and will allow for lower maintenance in the future. Aging in place remains an important component of the design as our team designs a home that is adaptable.

## 8. Comfort and Environmental Quality

We will provide both a comfortable and healthy indoor environment through the inclusion of an airtight envelope that allows for proper climate control. We will create a structure with materials that minimize chemicals, dust, pollen, biologicals, radon, and moisture as well as acoustical design strategies for controlling unwanted noise.

## 9. Energy Performance

Our design focuses on the reduction of whole-building energy consumption and the ability to generate clean energy that is needed on-site. We will be reducing plug loads and appliance loads by using Energy Star rated appliances and low-flow water fixtures to reduce the use of hot water. Our renewable energy generation will be provided through solar panels.