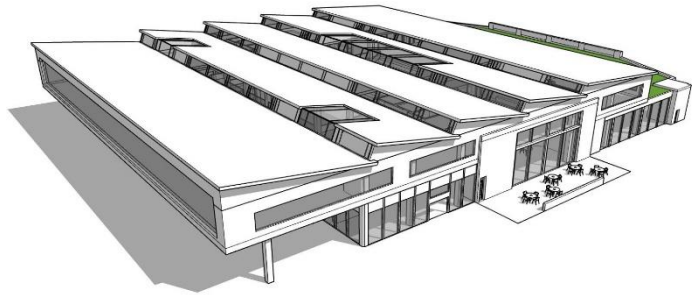


## Illinois Institute of Technology

### The Nook

#### Project Summary

The Nook, located at the crossroads of Goose Island and Old Town in northern Chicago, is an innovative and unique approach to a brick and mortar retail location. This two-story facility offers a split program between a retail store and community center, with the first floor functioning as a hybrid - crafts supplier and bookstore, and a second floor of complementing multipurpose rooms, assembly hall, and studio space. A large center atrium ties both of the floors together, making The Nook a thriving community center. The Nook is geared towards fostering a thriving community from the plethora of local schools and family-oriented demographic of the surrounding neighborhood. Visitors utilizing the multipurpose studio spaces above can obtain supplies from the large in-house retail below, while the building's design otherwise takes on a familiar, albeit engaging form as a center of books, school supplies, and canvasses. The Nook is designed to integrate seamlessly with both its customers and the greater community it serves.



This innovative retail location of 82,000 ft<sup>2</sup> is a revolutionary approach to both retail and energy conservation. Incorporating diverse spaces for occupants; while providing an educational aspect to energy usage. Optimizing both the site and building orientation; as well as, incorporating passive systems with high performance building envelopes, this retail location will be both economical and net-zero energy. The building houses many spaces including; storage, janitorial, office spaces, break rooms, mechanical and electrical rooms, mezzanine spaces, community rooms, art studios, and even cafes.

#### Design Strategy

To achieve a net-zero energy building, the team focused on passive energy reduction strategies and then applied the necessary active strategies. These innovative strategies offset the energy consumption for the building. Integrated strategies include: building orientation, daylighting, natural ventilation, HVAC control automation, night purging, thermal massing, radiant slabs, and solar photovoltaic panels. These strategies are intended to combine to form an environment that fosters high retail volume, a positive energy impact, and community engagement.

#### Project Data

Location: Chicago, Illinois, USA  
ASHRAE Climate Zone: 5A  
Lot Size: 285,000 ft<sup>2</sup>  
Building Size: 82,000 ft<sup>2</sup>  
Occupancy: 300 people  
Building EUI: 25.63 kBtu/ ft<sup>2</sup> /year  
EUI PV Production: 26.94 kBtu/ ft<sup>2</sup> /year

#### Technical Specifications

Wall U-Value (Btu/(h·ft<sup>2</sup>·°F)): U-0.0202 (Steel Framed)  
Foundation U-Value: F-0.520 (Unheated)  
Roof U-Value (Btu/(h·ft<sup>2</sup>·°F)): U-0.032  
Window U-Value (Btu/(h·ft<sup>2</sup>·°F)): U-0.36(Fixed) U-0.45 (Operable)  
HVAC: PSZ-AC (ASHRAE 90.1 Baseline)  
On-site PV: 31,456 ft<sup>2</sup>, 520kW

## Project Highlights

**Architecture:** The Nook's has three main entrances, one on the industrial southwest side, one on the community southeast side, and one in the middle of the north side. An atrium in the middle of the building will function as a community space for art shows, movie nights, and craft events. The large windows in it maximizes the use of skylight and natural ventilation. Its double height space allows for vertical air flow. The atrium includes a large amphitheater staircase perfect for individuals to read, study, and drink their coffee purchased from the nearby cafe. Multiple studios, with windows for maximized daylight, will line the top floor of the building. By maximizing daylighting and solar generation, the orientation and shape of building create an open environment for comfort.

**Engineering:** Building structure and building technologies intertwine to form a complex yet simple to operate system to help reduce energy consumption and maintain a high level of occupant comfort. The building will utilize a ground source heat pump to heat and cool the building. Radiant heating and cooling panels will also be used within the building.

**Market Analysis:** To create a unique retail space and community environment the retail building has a cost of 170.00 \$/ft<sup>2</sup>.

**Durability and Resilience:** One of the main focuses of this building is to be a lasting community center, as well as operating as an emergency shelter in times of emergency. Cots and emergency supplies can easily be set up in the large center atrium. Rechargeable lithium ion batteries packs will also be installed as an energy storage system for The Nook.

**Embodied Environmental Impact;** Having high standards for both energy conservation and environmental impact, the retail location is implementing a structural system that reduces the carbon footprint in various ways. A focus on locally sourced materials, low-carbon options, and reducing material usage and waste have impacted the project.

**Integrated Performance:** The architecture, building systems, and circulation approach come together to form a high-impact solution to the energy consumption. Thermal massing and night purging create a balanced approach to passive space comfort.

**Occupant Experience:** The intuitive space design reduces high traffic areas, allowing for more private areas for studios, and public spaces for cafes and retail. Large scale daylighting and building orientation allows for reading and art, while providing higher light levels in the retail portions of the building. The building program is catered towards the students from the surrounding schools to draw them to our building.

**Comfort and Environment Quality:** Targeted controls are used to maintain ventilation, light levels, and thermal comfort. Design strategies create acoustical zones to help maintain sound levels; without completely separating spaces.

**Energy Performance:** To meet the target source EUI, the team has focused on efficient equipment, reducing lighting and plug loads, and a ground source heat pump plant loop. The building will use only electric energy, and the PV array will be connected to the grid for reliability. The annual exported energy is greater than the annual delivered energy to the building.