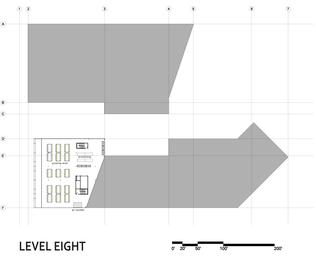
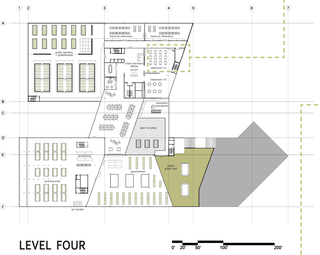


LEVEL EIGHT

LEVEL FIVE + SIXLEVEL FOUR

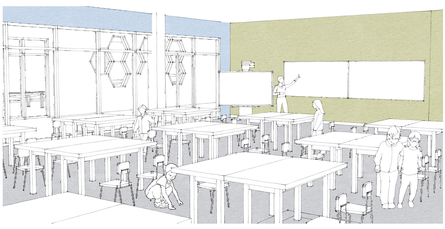


LEVEL THREE

LEVEL TWO

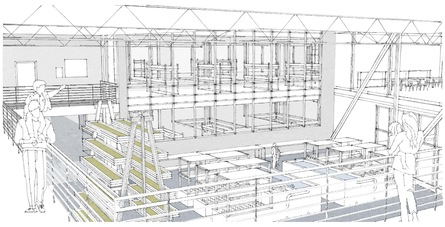
LEVEL ONE

COMMUNITY-FOCUSED



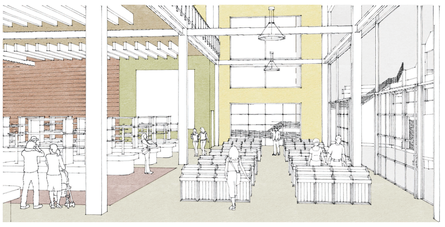
EDUCATION AND EMPOWERMENT

On the fourth floor, there are spaces dedicated to an after-school program for K-12 students. Hands on activities and interactive learning teaches the science of botany, encourages patience and helps students practice responsibility. It also connects the urban youth to nature.



INVESTMENT AND INNOVATION

The Cincinnati location will be the flagship facility for Gotham Greens. Part of the program is designated for plant science and botanical research. It is positioned adjacent to the education spaces to encourage visibility and create familiarity with a STEM discipline.



COMMUNITY AND COMMITMENT

An organic grocery store is located on the ground floor and opens directly to an outdoor patio which hosts a seasonal farmer's market. This provides the community with fresh greens grown right in the facility. This commitment to locally grown food helps promote holistic wellness and a sense of ownership.

SUSTAINABILITY DRIVEN

Low Emissivity Glazing

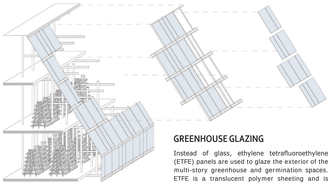
Green Roofs

Hydroponic Growing Systems

Recycled Steel and Rebar

Fly Ash Concrete

Rewall Ceiling Tiles



GREENHOUSE GLAZING

Instead of glass, ethylene tetrafluoroethylene (ETFE) panels are used to glaze the exterior of the multi-story greenhouse and germination spaces. ETFE is a translucent polymer sheeting and is very valuable for a design whose envelope is nearly 70% transparent.

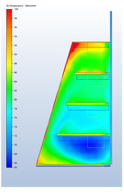
ETFE is a plastic material that transmits more light than glass, costs 24-70% less to install and is only 1/100th of the weight of glass. These characteristics are valuable to a design that is machinery-heavy and requires an immense amount of sunlight.

Because the infill panels are so light, a robust framing system is not needed. The internal columns and beams carry the structural loads of the machinery, while a lightweight aluminum framework clads the building.

THERMAL PERFORMANCE

The slanted form in the multi-story greenhouse originates from a series of thermal simulation trials from ARCH 771: Architectural Research Studio. This study was conducted in pursuit of the impact of design factors such as massing, HVAC placement and solar orientation.

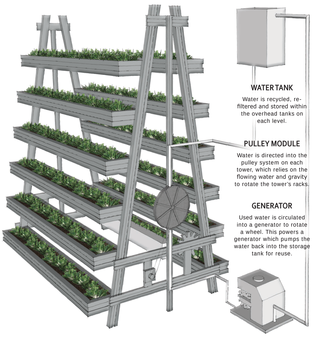
The form is modeled after a passive solar greenhouse, which is typically shaped against an existing building. While its sloped massing leads to a decreased amount of workable floor space, its thermal evaluation outperformed the other trials in air circulation and solar heat gain. Its site orientation and massing maximize sun opportunities, which is integral given the typology. Its staggered floors allow for air circulation without limiting floor-by-floor air control. Ultimately this form was selected for Relocated Roots because it demonstrated a clear control of the internal environment and aligned well with the considerations of the site.



THE VERTICAL FARM

image from science.edu.sg

An existing vertical farm called, "Sky Greens" provides an excellent precedent design of a hydroponic vertical growing system. This A-shaped tower measures up to six meters tall and can grow up to 5x more crops than the same amount of farmland. This system was selected for Relocated Roots for its modularity and relatively simple installation. The ability to maintain and repair individual units as necessary is also a strong benefit to this design.



CONCLUSION

Not only does Relocated Roots serve the community, but the design itself promotes a message. With a new typology and contemporary construction techniques, the design symbolizes both sustainability and a concern for the well-being of the environment. The design of the multi-story greenhouse utilizes new materials and systems while functioning and producing as a successful farming facility. Architecture can promote change through careful and considerate design. By undertaking a struggling site, incorporating principles of sustainability and transforming the space into a place of community and growth, the design of Relocated Roots demonstrates that architecture can become a symbol of the future and act as a vehicle by which social change can travel.

According to Vertical Harvest, an urban agriculture facility in Wyoming, a traditional farm yields about 20,000 lbs of crop per acre per year. Although crop yield varies, this is a consistent figure.

Vertical farming uses the same footprint, but in a denser way. Vertical Harvest reports producing 100,000 lbs of food for only 1/10th of an acre - a land use of 1/50 of traditional farming.

According to the product specs, the Relocated Roots' growing system located within the multi-story greenhouse can produce the same amount of yield per 100 towers as an entire football field.

With 80 A-Go-Gro towers and 40,000 sf, the Relocated Roots' vertical farm can produce as much yield as conventional farming, with a 15% decrease in footprint, and 90% decrease in water.

Vertical farming reduces the need for pesticides, transportation and seasonal growing. It uses less water, land and resources as well. It can provide a solution for healthier community!