U.S. DEPARTMENT OF ENERGY
SOLAR DECATHLON

Ball State University

Elementary School Mallory Park

Project Summary

What characterizes the best spaces for learning? The answers to this question are as varied as the people you ask. Some prefer quiet muted colors, others want environments that are bold and striking; some want small windows to limit distractions, others want a wall of windows connecting to the outdoors. Though the ideas are limitless, a singular theme runs clear – spaces for learning must inspire users to open their minds and enrich their spirits.

Mallory Park Elementary School's mission is to make hands on learning accessible to everyone, from small children to the community's seniors. Mallory Park is designed to enhance and continue to develop the strong themes of sustainable design, green living, and agricultural education that are already highlighted as important by the surrounding Englewood Village neighborhood. We view sustainable as including easily maintained, long-lasting materials, high-performance building systems and inspiring details that encourage learning. Our location enables the creation of a community campus and is central to ongoing community integration. The combination of visible sustainable practices, flexible learning spaces, community support areas and dynamic architecture inspires and stimulates both building occupants and the surrounding community.

Design Strategies

With the project goals in mind, the team's design strategy includes a tight building envelope and energy efficient systems while providing excellent indoor environmental quality to Mallory Park Elementary School occupants. The design team is also exploring innovative elements such as inclusive restrooms, flexible gathering spaces, and universally designed environmental education areas.

Project Data

- Location: 3005 E Washington St, Indianapolis, Indiana, USA 46201
- Climate Zone: 5A
- Building Size: 55,000ft^2, 2 Story
- Lot Size: 7.34 acres; 319,793 ft^2
- Source EUI Target: 22.2 kBtu/ft^2/yr
- Site EUI Target: 11.8 kBtu/ft^2/yr
- Final Calculated EUI: 3.04 kBtu/ft^2/yr
- Construction Cost: $126.63/ft^2
- Occupancy: 300 Students and 30 Staff

Technical Data

- Wall R-value: 24
- Roof R-value: 40
- Window U-Factor: 0.24
- Window SHGC: 0.27
- HVAC: Geothermal Ground Source Heat Pumps as well as Supplemental Fan Coil Units
- On-site PV: Annual Production 202.7 MWh

PROJECT HIGHLIGHTS

Elementary School Mallory Park

Architecture

Stunning design aesthetic that incorporates smart, sustainable building science for a net-zeo building. Integrate building form and function with teh surrounding site and neighborhood.

Engineering

We will be using new and efficient building technologies to reduce construction time and material cost. We are exploring a frost protected shallow foundation that will reduce the amount of concrete and formwork required for traditional foundation systems. This project proposes to utilize active rainwater collection and filtration to assist in reducing building water needs. There is also an opportunity to employ a geothermal heat pump system as part of the site brownfield remediation.

Market Analysis

RSMeans is being used for Market Analysis in this portion of the proposal. At 55,000 sq. ft. and a perimeter of 1,800 linear feet, E.I.F.S. walls and a rigid steel construction puts the cost per square foot at $175.75. Effectively, the estimated construction cost totals at $9,666,250.

Durability and Resilience

The school will have on-site photovoltaic panels that will provide emergency support to the school in case of a grid outage. On-site water collection and storage for the on-site farm will allow it to function even during drought periods. The exterior cladding system will allow weathering over time to combat abrasion from natural elements and human behavior.

Embodied Environmental Impact

Buildings are the leading cause for excessive carbon emissions and the steady increase in embodied energy. One way we plan on reducing this is to use locally available and sourced materials. We would also like to use recyclable materials within our elementary school such as wood, steel, and bricks. This could be an opportunity to match our historical context even more. PR Mallory, the neighboring building, is constructed from bricks and timber. Both materials arereadily available in Indiana and can be locally resourced.

Integrated Performance

For the most efficient building performance, we are combining passive and active systems. Systems that we are wanting to implement into our project are green walls, clerestories, operable windows, and shading devices. Our site is also aiming to help provide an extra layer of design by incorporating a learning experience for the community by using native plants in the farm and community garden. Such native plants include Milkweed, Switch Grass, and Flowering Dogwood trees.

Occupant Experience

Everything in a building effects an occupant's experience - clean, fresh air, quiet mechanical systems that limit distraction, large windows that allow natural daylight, and comfortable spaces that allow for the feeling of safety and security. As architects we include these elements that are often overlooked, but we want to highlight each of these good practices allowing them to be used as learning tools that inspire future generations. We propose solar panels to educate people and power the building, biophilic elements out every window and learning space, and glimpses into wall and ceiling cavities for increased knowledge.

Comfort and Environmental Quality

Utilize equipment that can control the temperature and the relative humidity as well as eliminating pollutants increase indoor air quality. Limited fluctuations in temperature lead to less distractions and greater thermal comfort. Mixed natural and mechanical ventilation allow the building to adjust to the climate outside. Effort to control the acoustical and lighting comfort is paramount to the design and placement of the programing.

Energy Performance

We are aiming for a Source EUI of 22 for our project, which is a 75% reduction from the baseline calculated in ZeroTool, and exceeds the Architecture2030 design target of 25. The building will be designed with high efficiency lighting and incorporate Solatubes to decrease the lighting energy use even further. The extensive site allows for abundant PV and wind energy collection to offset energy costs over the lifespan of the building.