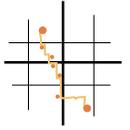




Team Barrio Oeste
Barrio Oeste



SUNBLOCK
Barrio Oeste



University of Arizona **Mixed-use Multifamily (MM)**

Project Summary

Barrio Oeste rejuvenates the idea of a mixed-use multifamily community. Situated just southwest of downtown Tucson, Arizona, BarrioO's community preserves and cultivates the rich history of Tucson in alignment with the adjacent Mission Garden, which preserves and exhibits the indigenous agriculture traditions that go back thousands of years in Tucson, and Barrio Sin Nombre, home to a few dozen generational family homeowners. The development has three buildings consisting of three mixed use amenities open to the community and 154 dwelling units targeting young professionals, single parents and multi-generational families in the greater downtown and Menlo Park area. Unit types ranging from one to three bedrooms accommodate singles looking for reasonable housing options in the city as well as families looking for a more urban lifestyle. BarrioO's close proximity to the electric Sunlink streetcar and the Loop bike path engages the entire Tucson collective by encouraging them to travel responsibly and leave a smaller carbon footprint.

Barrio Oeste is a reflection of our commitment to challenge today's building industry to be better. **BarrioO and the greater SunBlock community is exemplary of how to integrate high performance with beautiful design in one of the harshest climates in the US.**

Design Strategy

Barrio Oeste is a crucial component of SunBlock: a network that generates carbon-neutral thermal energy and stores it near where it will be used. Our goal is to condition buildings and provide hot water for buildings in SunBlock communities using carbon-neutral energy. SunBlock can do this at a lower economic and environmental cost than using gas or electricity from the grid. While SunBlock relies on technical solutions, equity is at the heart of the concept. Sharing energy allows everyone in our community to reach a greater potential.

In conjunction with SunBlock, BarrioO surpasses the stringent PHIUS+ 2021 energy targets by relying on basic heat rejection, retention and avoidance strategies as well as integration of passive systems and high-performing mechanical where needed. By keeping energy efficiency and occupant experience at the forefront of the design process without compromising functional, beautiful and healthy design, residents of this community will find a heightened sense of wellness within this neighborhood.



Project Data

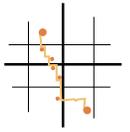
- Location: Tucson, Arizona, USA
- Climate zone: ASHRAE 2b (Hot, Arid)
- Lot size: 16.4944 acres
- Building size (three total): 208,000 ft²; 4 stories
- Occupancy: 304 people; 684 ft²/person
- Target source EUJ: 79 kBtu/ft²/year
- Estimated average utility cost: \$57.80/month per unit
- Estimated total construction cost: \$16,708,164.34

Technical Specifications

- Exterior Wall Thermal Performance: R-29.9
- Foundation Edge Thermal Performance: R-13.02
- Roof Thermal Performance: R-38.1
- Window U-Value = 0.25, SHGC: 0.25 & U-Value = 0.19, SHGC: 0.6
- Ventilation: Dedicated Outdoor Air System for commercial units; residential units will each have own Energy Recovery Ventilator
- Renewable: Monocrystalline Solar Panels from Pima Solar; grid-connected high efficiency; rainwater collection and filtration system

Project Highlights

Competition Goals



Engineering

- + carefully controlled roof and wall assemblies keep enough heat out in the summer
- + allow ventilation by use of a DOAS and ERVs for residential units
- + rainwater harvesting collects annual 12" during monsoon season

Architecture

- + a threshold between downtown and the forgotten Barrio Sin Nombre
- + marries the historic vernacular of Tucson with innovative technology
- + sensitivity to local climate to achieve carbon neutrality

Durability and Resilience

- + heat retention, heat rejection and heat avoidance
- + assembly of the building envelope specifically tailored to the building orientation
- + southern facade is exposed to Southern solar radiation daily and is pivotal to a projects' energy performance
- + energy performance is tested with climate data from Hermosillo, MEX, representing Tucson's future climate

Embodied Environmental Impact

- + use local materials and labor
- + establish the Barrio site as home base for Phase 1 assembly of the other SunBlock ADU and Attached Housing modules
- + cut down on waste and transportation
- + design for future adaptability rather than destruction

Energy Performance

- + interconnected energy generation, conservation and renewal
- + allows single units to be more energy-conscious thanks to overall building orientation
- + manipulate harsh solar radiation
- + PV surplus energy into SunBlock
- + store SunBlock's energy close by, mitigate the issue of the high capacity grid

Occupant Experience

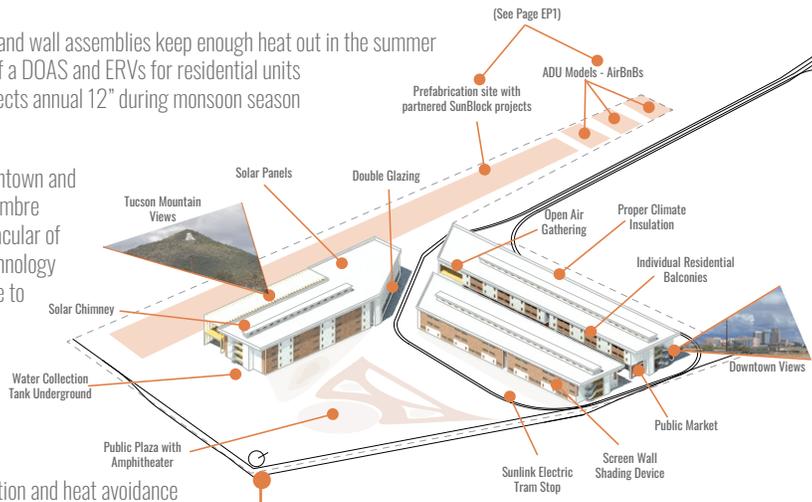
- + serendipitous environment for all residents and members of the surrounding community
- + desired amenities and opportunity for social interaction
- + building forms follow function, an easy-living habitat
- + people are "thinking green" and will take pride in Barrio's sustainable community

Integrated Performance

All systems within Barrio are informed by each other. Each building's orientation is optimized for use of passive systems such as heat avoidance, evaporative cooling and radiant heating. Controlled lighting systems allow optimal light conditions for different uses and diminishes all unwanted direct solar gain. The mass timber structural system provides framework for the organization of mechanical systems where they are needed to improve thermal comfort.

Comfort and Environmental Quality

User comfort is a priority in every space, from public to private. Overall building orientation focuses on controlling all direct sunlight that is present and allowing adequate airflow and ventilation throughout. Having strategic operable windows ensures proper ventilation while the DOAS ensures filtration and dilution. Light shelves, clerestory windows, and incorporating biophilic design principles are all proven ways to exceed the desired level of daylighting, thermal comfort and a happy state of mind.



Market Analysis

The charm and amenities in this growing district of Tucson attracts cyclists, college students, and single parents, but something is missing: affordable housing. Being so close to downtown, there is a trajectory of growth for this development and neighboring Barrio Sin Nombre that continually attracts new residents who are looking for a higher-density place to live without pushing out existing residents. The high density potential on this site provides great opportunity for a lower-cost of living and lower construction costs.

