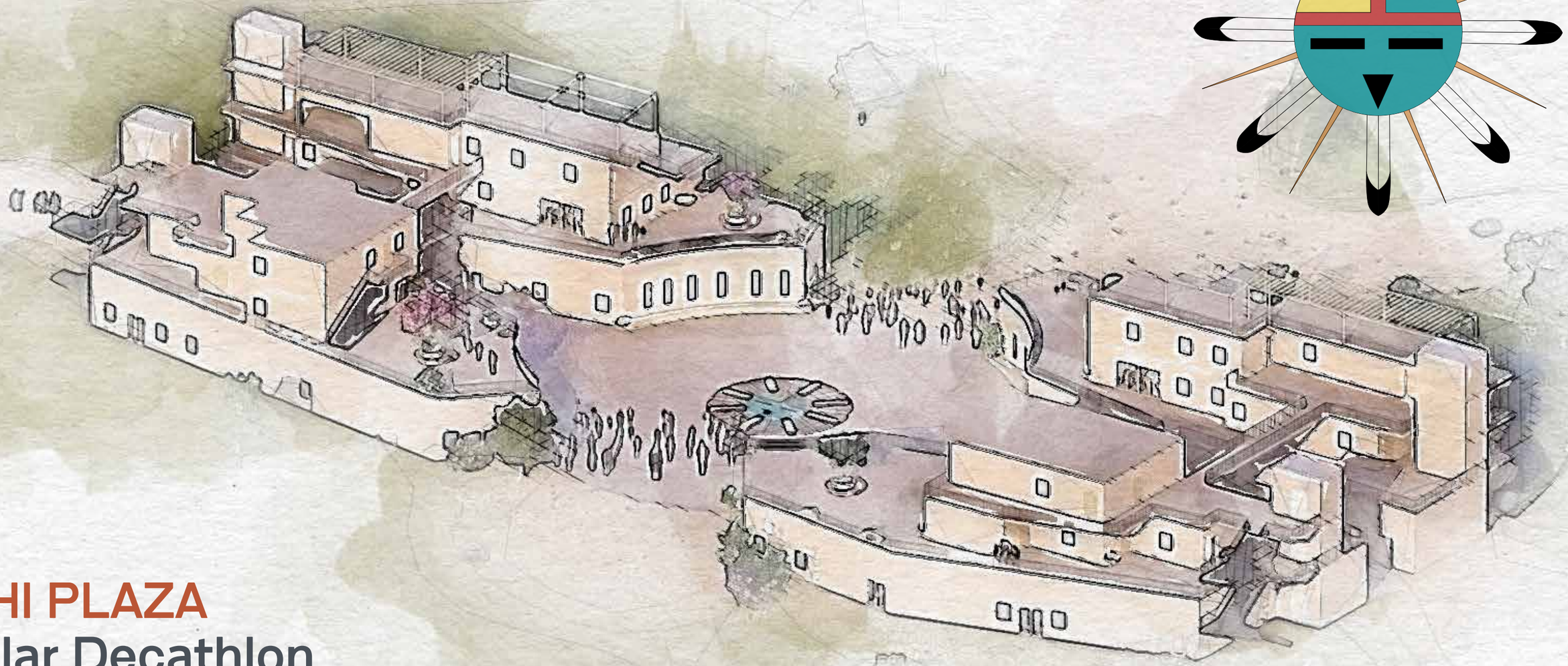


SIHI PLAZA

Solar Decathlon
Multifamily Housing

University of Arizona

Tawa'Ovi Community for the People of the Hopi Nation

OUR TEAM

Colleen Barbanti
DESIGNER/TL

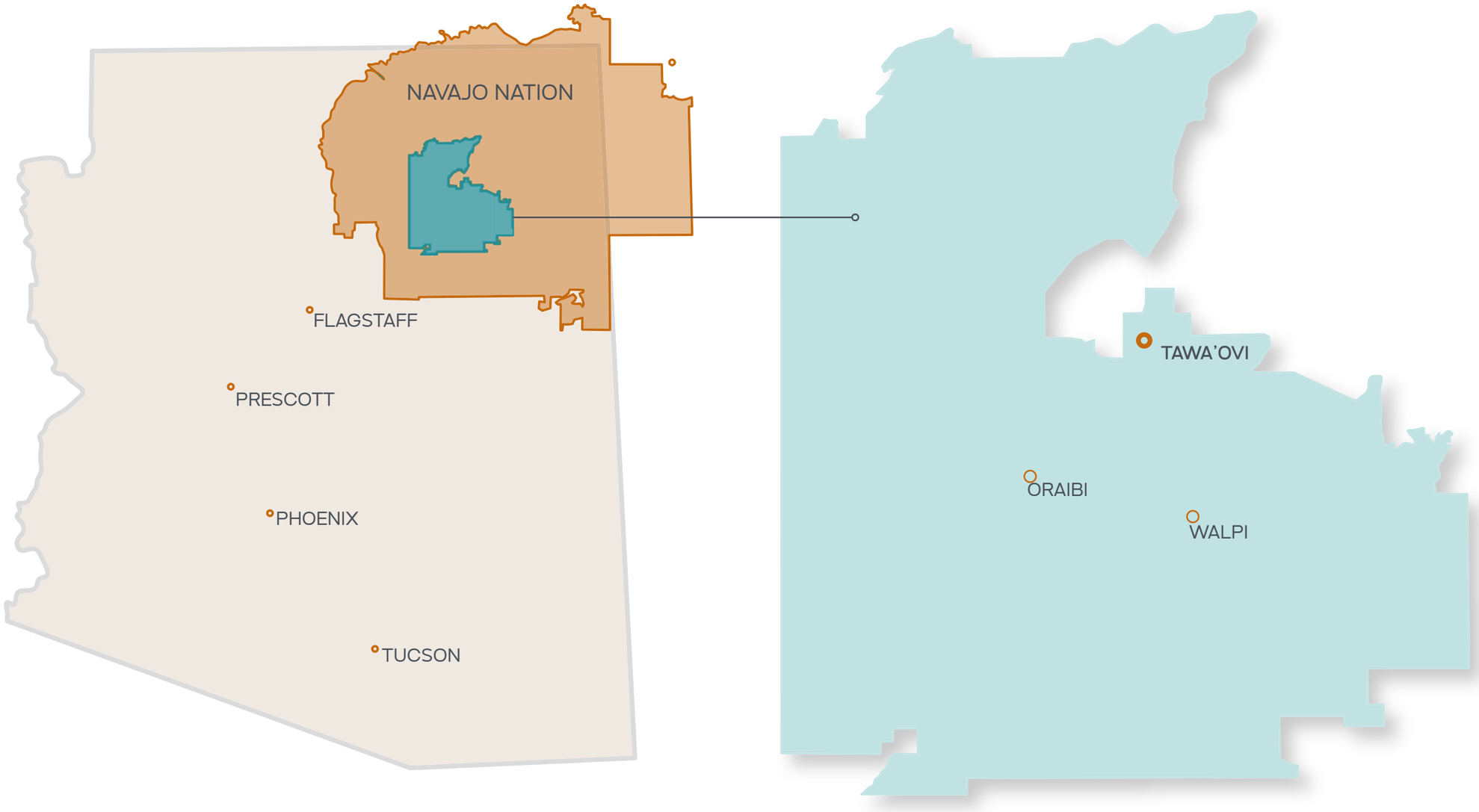
Jeannell Hilton
DESIGNER

Ashlea Hume
DESIGNER

Chloe O’Hail
DESIGNER

Travis Reihner
DESIGNER

HOPI NATION



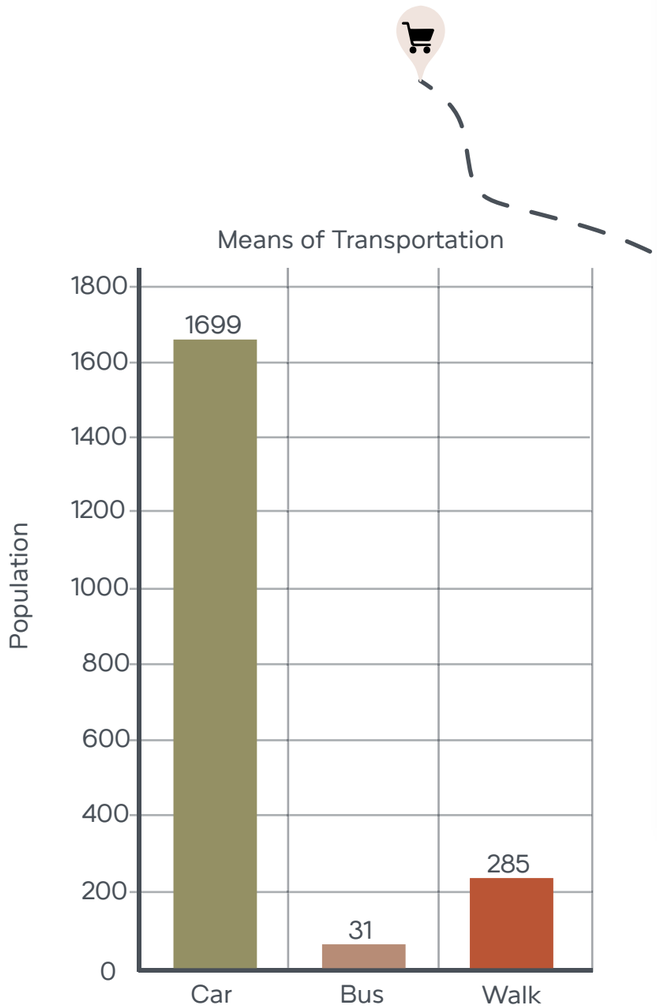
ARIZONA

HOPI NATION

Tawa-Sun Ovi-Village

HOPI NATION
a relatively small reservation, bordered on all sides by the Navajo, in Northern Arizona. Currently, the Hopi are dealing with a significant loss of youth, as it is difficult for young adults to aquire education and subsequent jobs on the Reservation.

CAR DEPENDENCY



FOOD

Bashas' Grocery Store

~1hr or 56.9 miles ~20 hr 7 min.

Hopi Cultural Center

~15 min. or 15.5 miles ~5 hr 40 min.

GAS AND PUBLIC TRANSPORTATION

Kykotsmovi Gas Station

~22 min. or 21.6 miles

Keams Canyon Food Mart and Gas Station

~43 min. or 39.1 miles

Hopi Cultural Center - Road Stop (Bus Stop)

~17 min. or 15.8 miles ~6 hr

Second Mesa - Road Stop (Bus Stop)

~22 min. or 20.5 miles ~7 hr 24 min.

SERVICES

United States Postal Service

~16 min. or 16 miles ~5 hr 50 min.

Hopi Health Care Center: Emergency Room

~27 min. or 24.7 miles ~7 hr 39 min.

HOPI CULTURE

BACKGROUND

- Hopi have been settled in Northern AZ since 1100AD
- Lack of economic opportunity has lead to decline of population
- Tawa'Ovi is a community plan to address the issues facing Hopi

VALUES

- Water Conservation
- Community
- Stewardship of the Land
- Resilience
- Independence

CULTURE

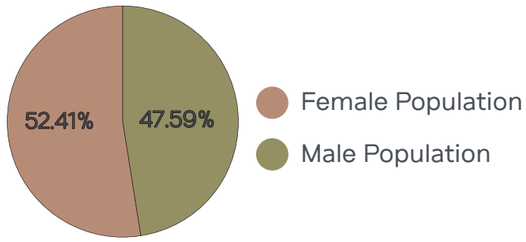
- Dry Farming
- Communal Cooking
- Celebrations for Agriculture

DESIGN RESPONSES

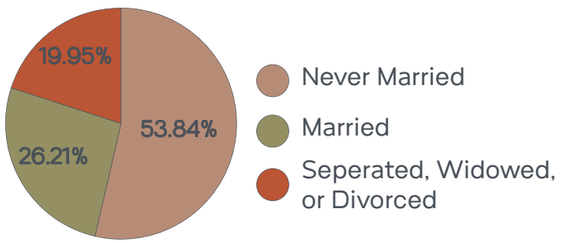
- Open plan communal spaces
- Emphasis on large kitchens
- Terraced roofs
- Minimize waste
- High solar production
- Radiant Flooring systems

DEMOGRAPHICS

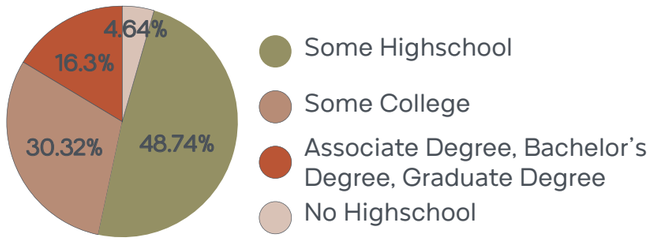
Population: 8,104 people



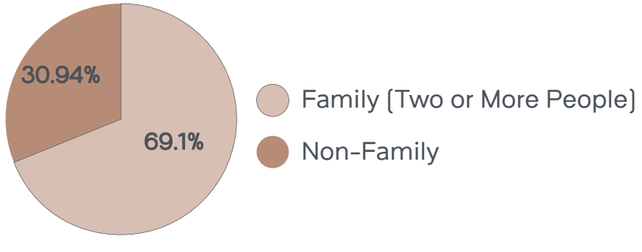
Marital Status



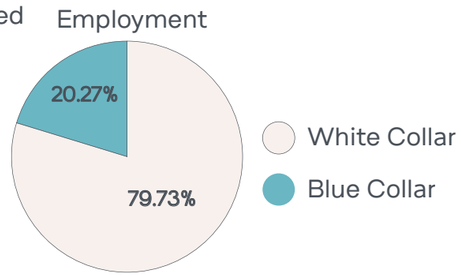
Education



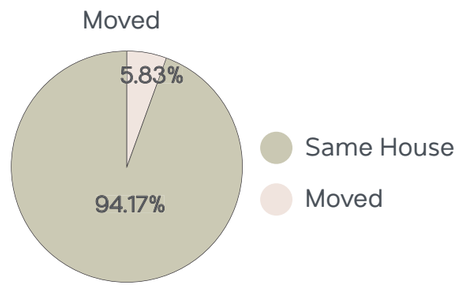
Households



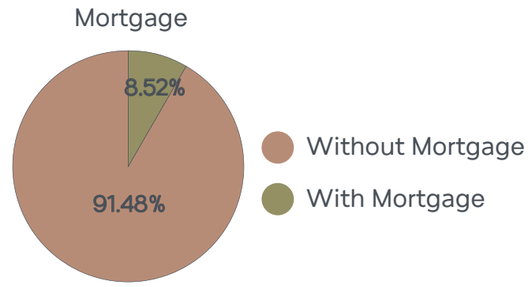
Moved Employment



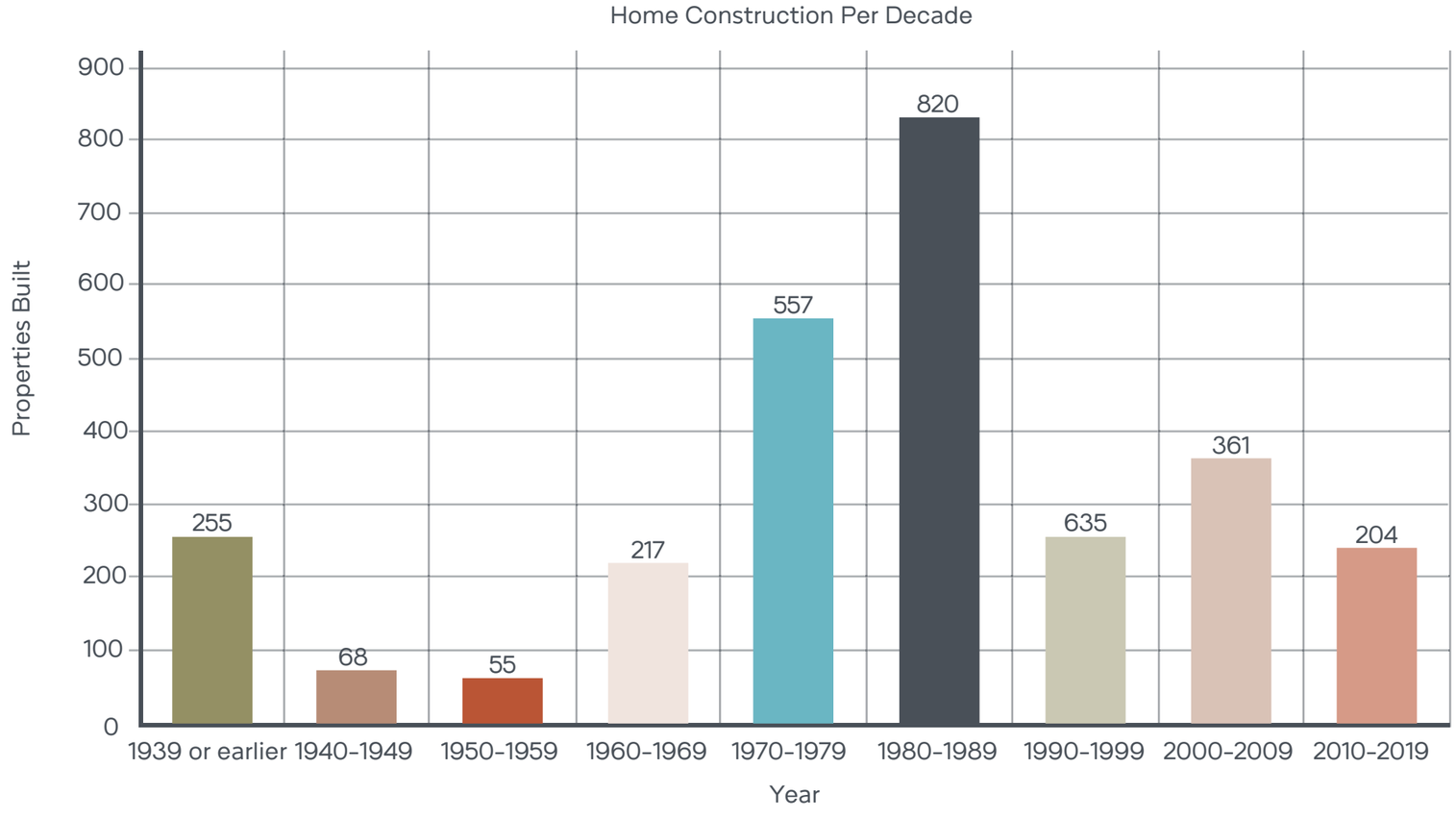
Moved



Mortgage



Home Construction Per Decade



THE MISSION

Create a PHIUS Zero multifamily housing complex, within a new solar powered micro-grid village.

The project will respect Hopi cultural traditions and beliefs, while promoting student engagement through community amenities and dwelling units that appropriately respond to climatic conditions.

PROJECT GOALS

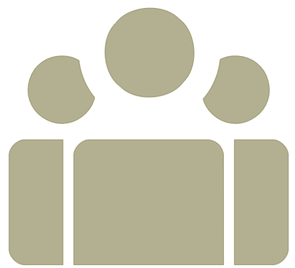
A CULTURE OF SUSTAINABILITY

To create a community that keeps the culture of the Hopi alive while incorporating modern and efficient building techniques.

RESPECT FOR THE LAND

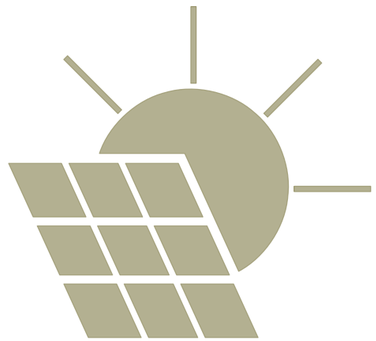
Exterior spaces that allocate room for traditional activities and provide a sense of connection to the land.

COMMUNAL GROWTH



Plan a multi-family housing project that is communally connected while maintaining occupant privacy.

ENERGY INDEPENDENCE



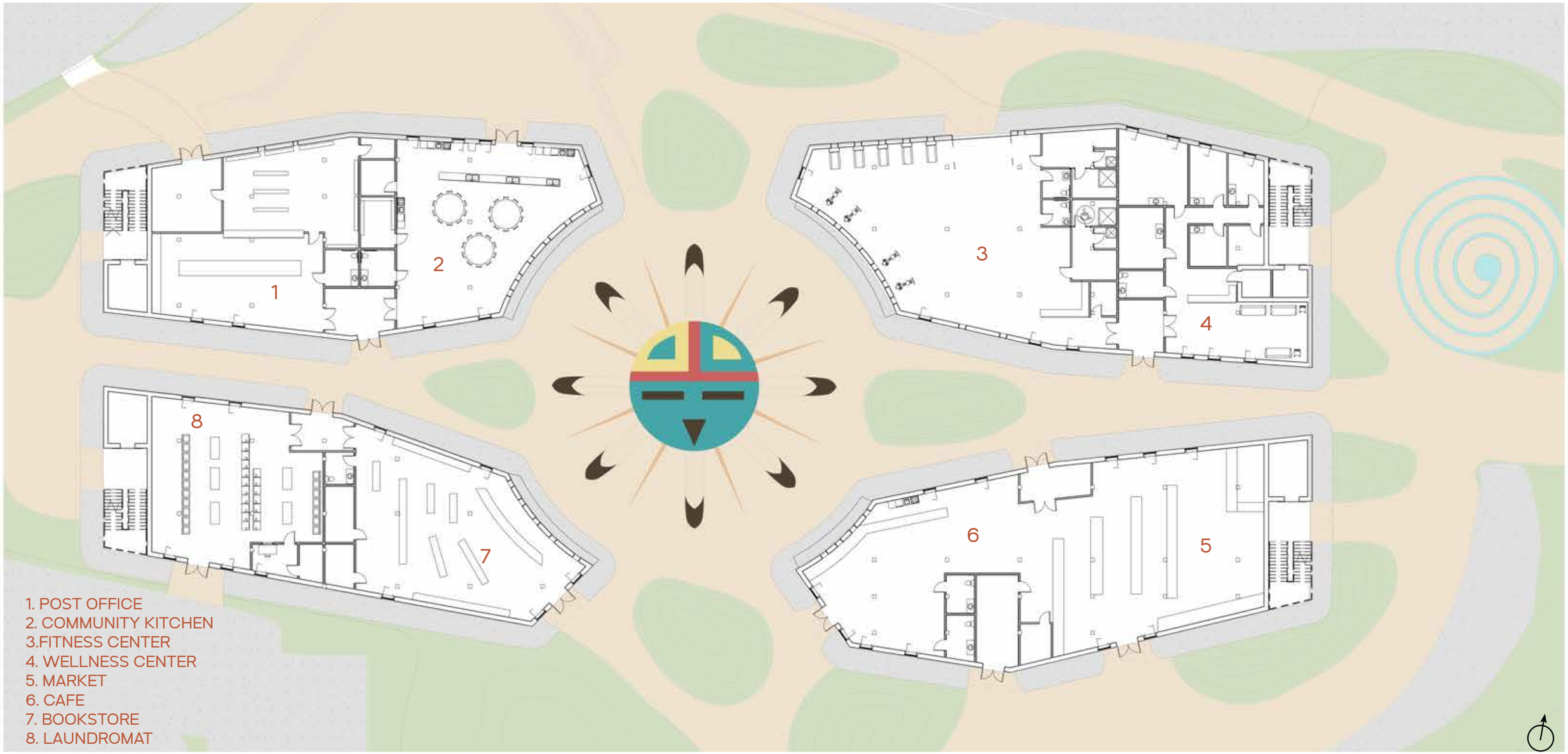
Plan a community that is self-sustaining, grows the local economy, has a Net-Positive energy footprint, and meets PHIUS standards.

ENGAGING THE SITE

- Quaking Aspen
- Willow
- Saltbush
- Yucca
- Manzanillo Olive
- Mission Olive
- Pear
- Peach
- Apple

SIHI PLAZA

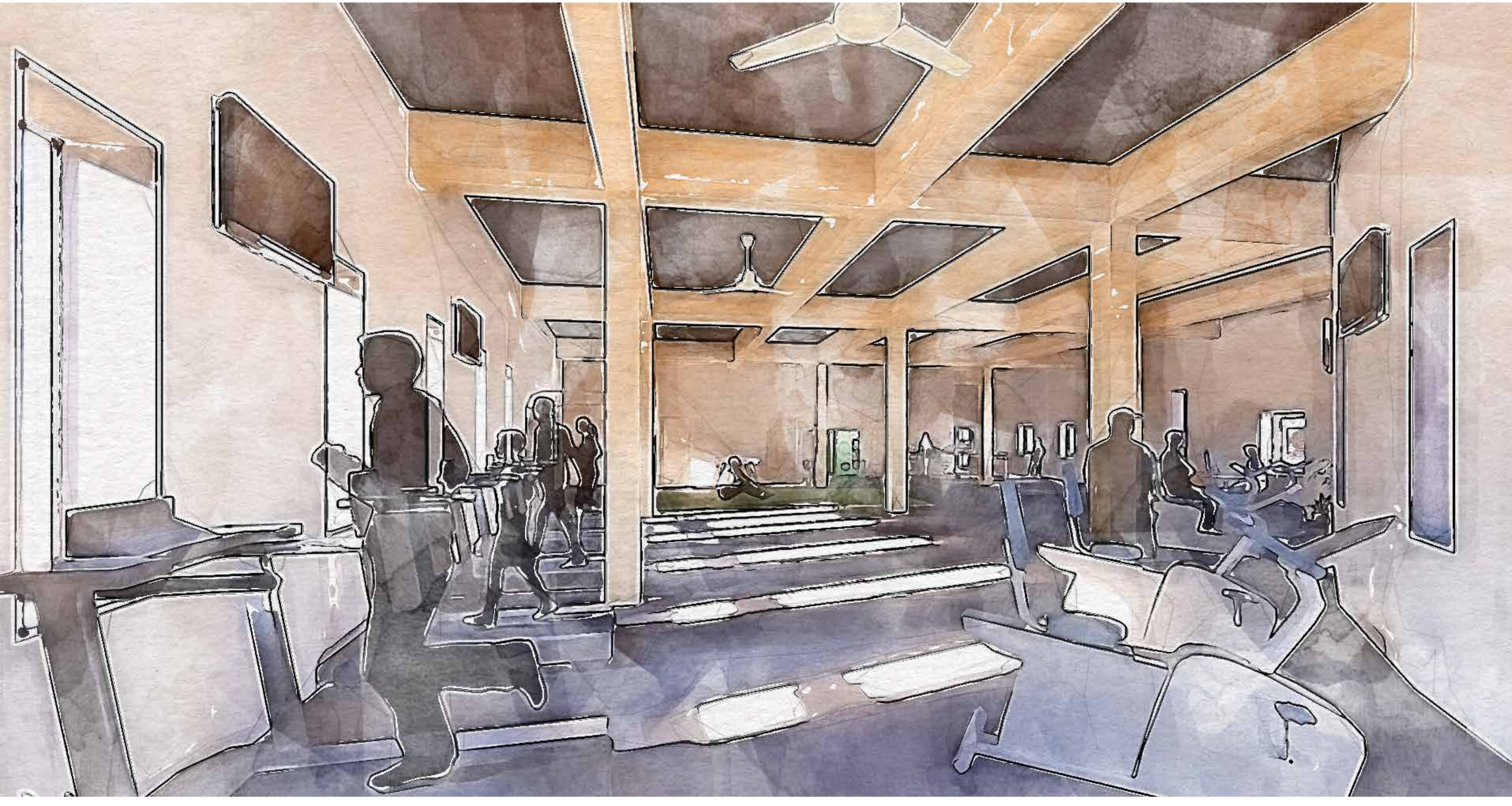
STIMULATING THE ECONOMY



COMMUNITY KITCHEN

Basket by Iva Honyestewa

FITNESS CENTER



BOOKSTORE

STUDENT HOUSING

2nd Level NE building

TERRACE EXPERIENCE

CONNECTION TO NATURE

HEALTHY MATERIALS

Glulam Southern Pine

Locally sourced

Limewash Plaster

no VOCs

hypoallergenic

mold resistant

Marmoleum Flooring

allergy-free

lasts for 30 years

97% natural materials

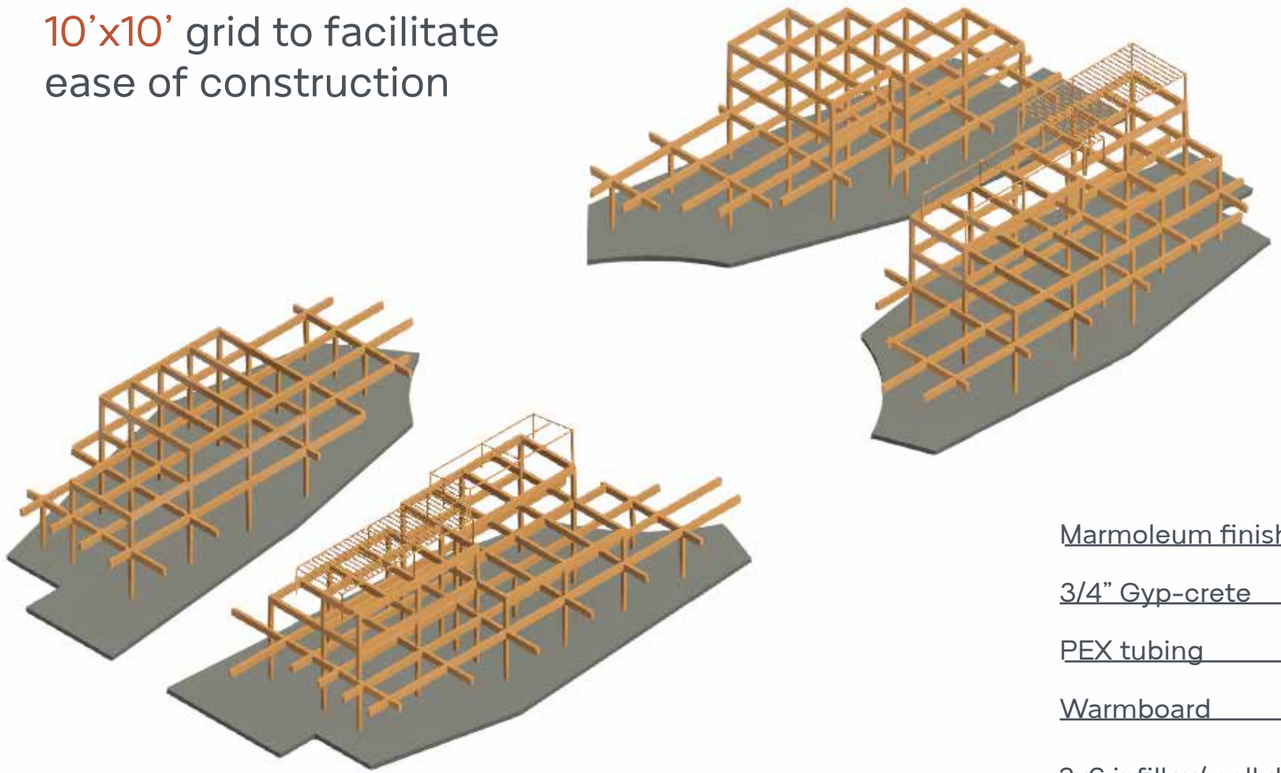
Butcher Block Countertop

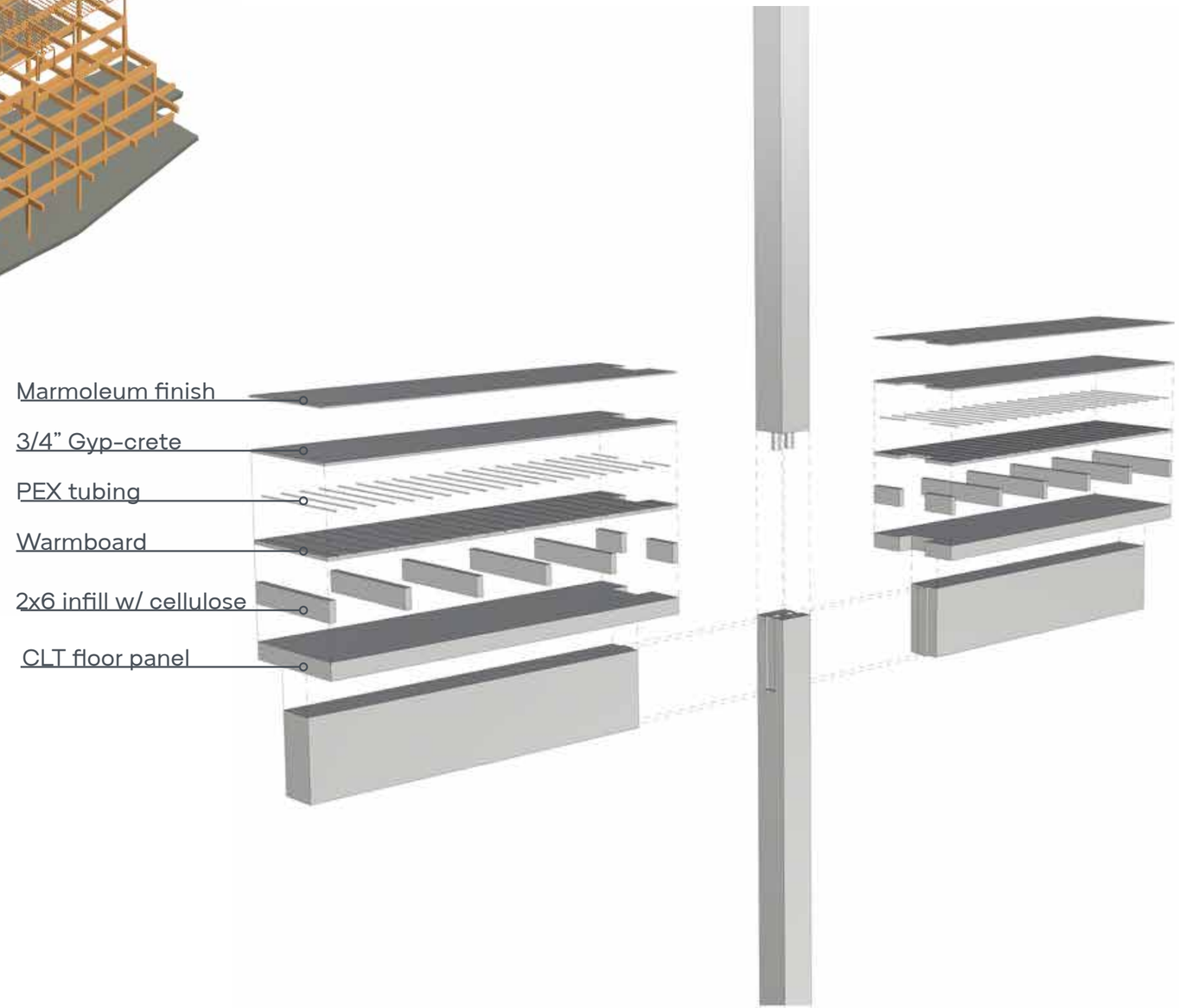
made from salvaged wood

SOURCING CLOSE

STRUCTURE

10’x10’ grid to facilitate ease of construction





CLIMATE RESPONSE

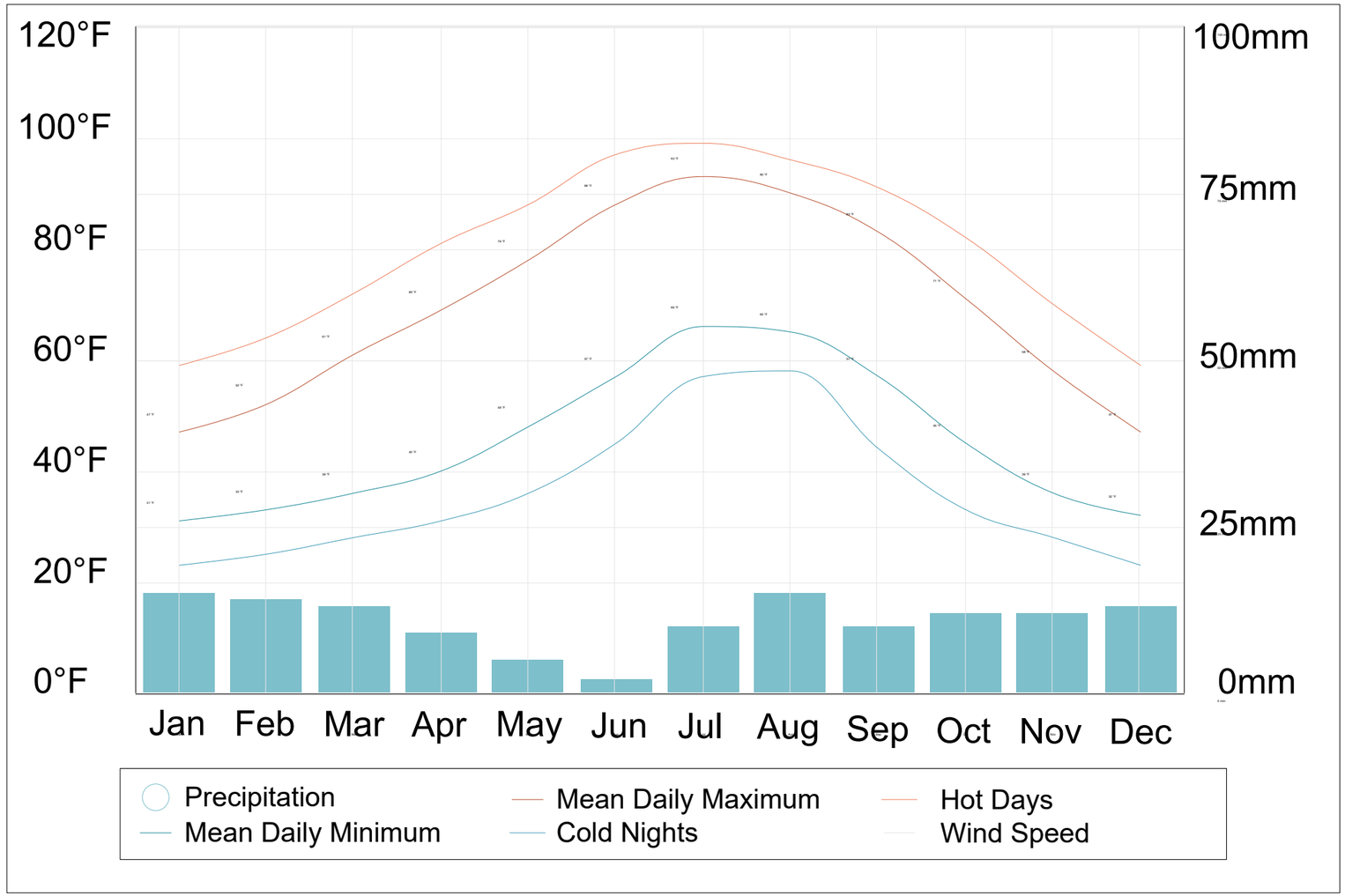
ASHRAE CLIMATE 5B

PHIUS PRESCRIPTIVE VALUES

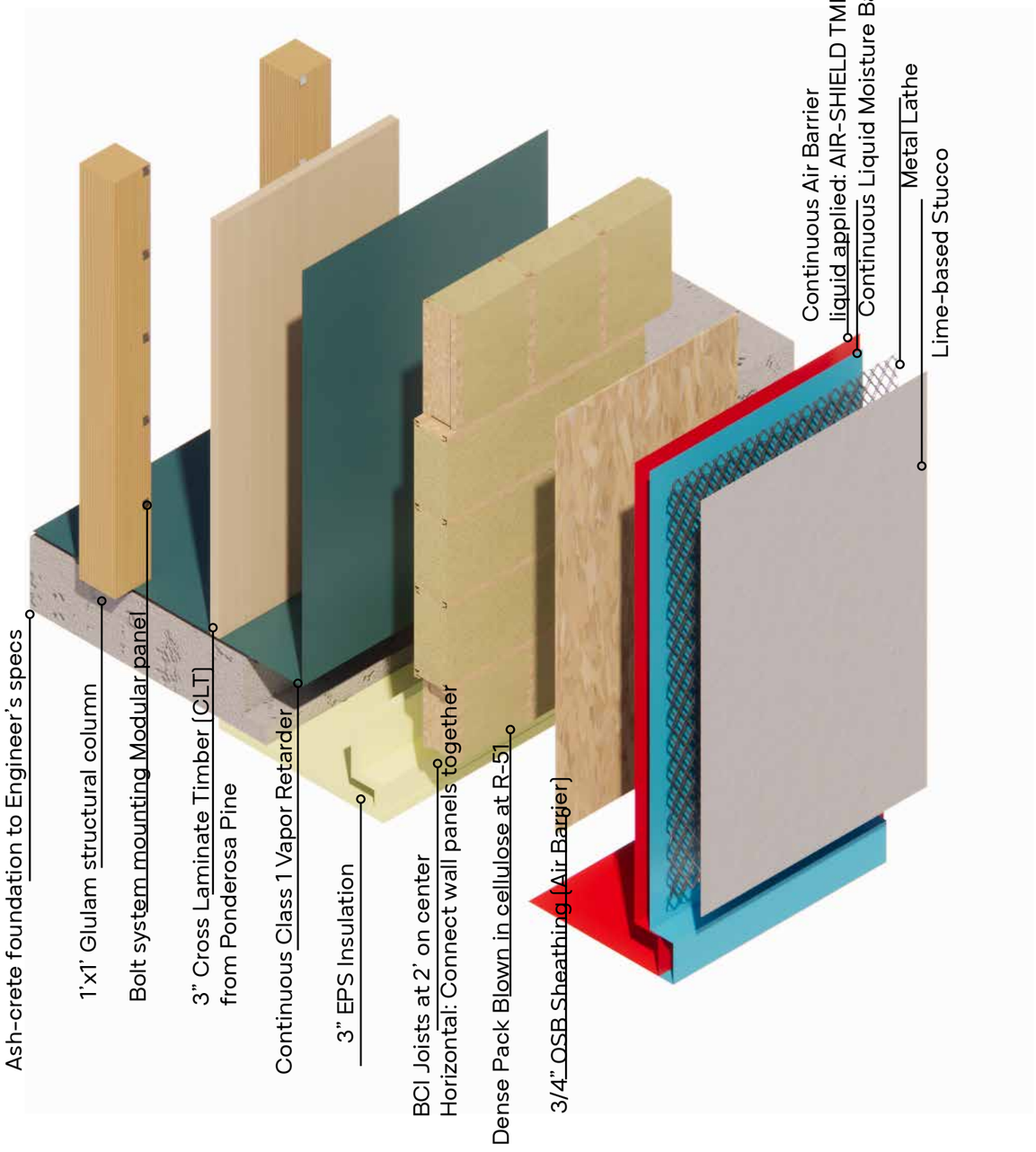
Max U-Value: 0.23
Minimum SRE for E/HRVs: 0.75
Minimum Wall R-Value: 31
Minimum Roof R-Value: 61

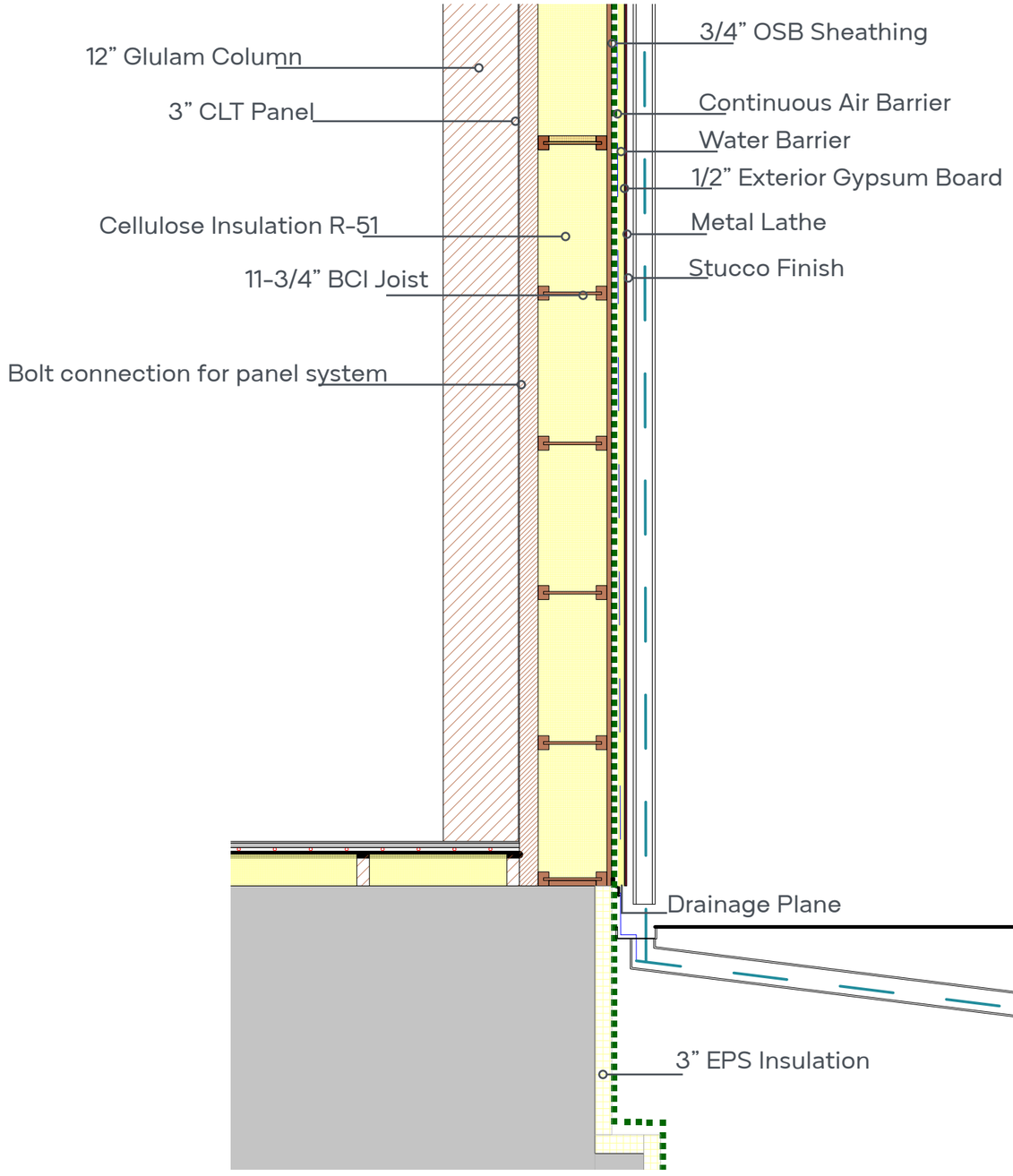
ACTUAL BUILDING VALUES

U-Value of Windows: 0.13
SRE for E/HRVs: 0.83
Wall R-Value: 51
Roof R-Value: 70



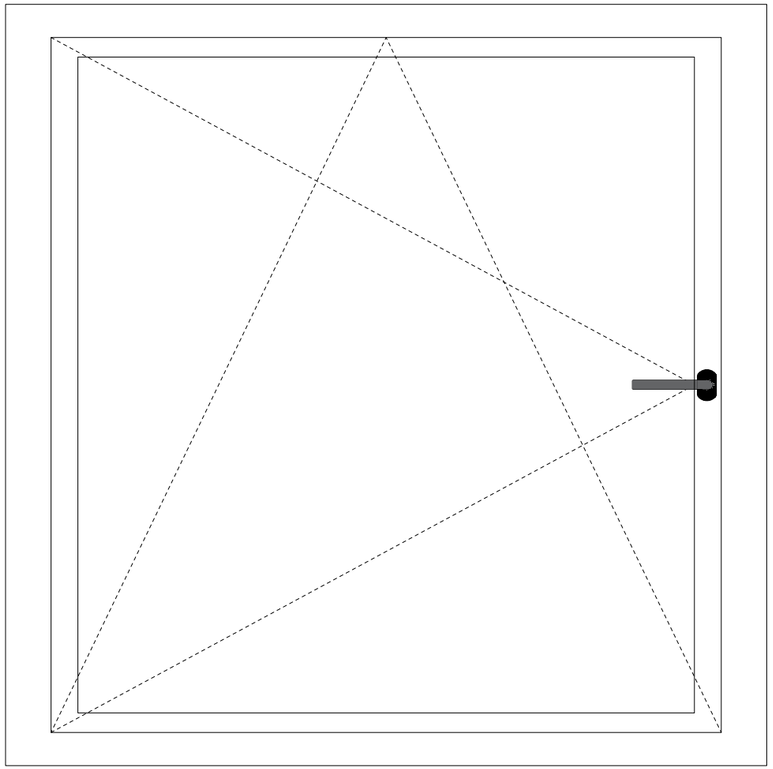
ENVELOPE


Continuous Air Barrier
liquid applied: AIR-SHIELD TMP
Continuous Liquid Moisture Barrier
Metal Lathe
Lime-based Stucco
Ash-crete foundation to Engineer's specs
1'x1' Glulam structural column
Bolt system mounting Modular panel
3" Cross Laminate Timber (CLT)
from Ponderosa Pine
Continuous Class 1 Vapor Retarder
3" EPS Insulation
BCI Joists at 2' on center
Horizontal: Connect wall panels together
Dense Pack Blown in cellulose at R-51
3/4" OSB Sheathing (Air Barrier)

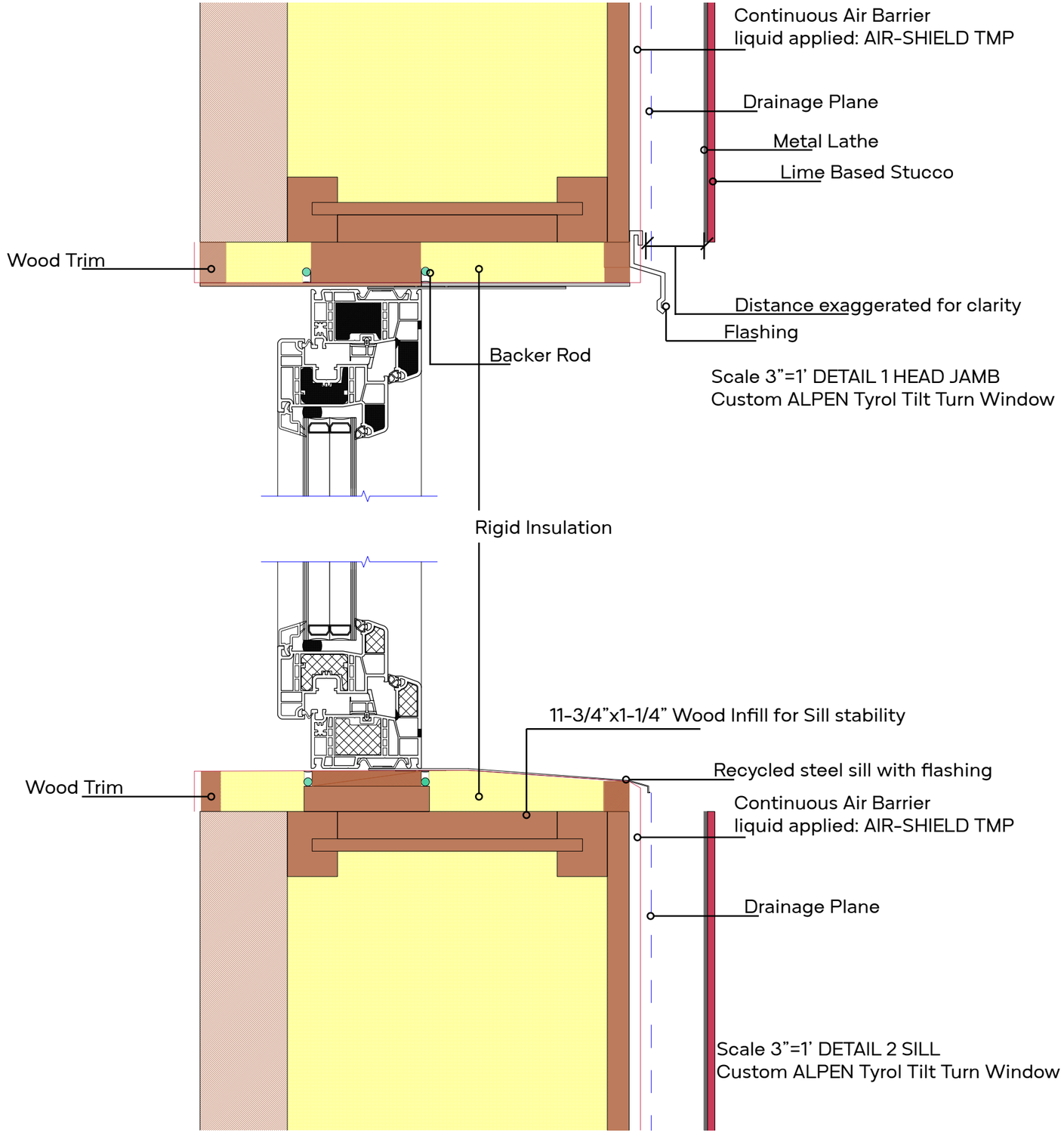

12" Glulam Column
3" CLT Panel
Cellulose Insulation R-51
11-3/4" BCI Joist
Bolt connection for panel system
3/4" OSB Sheathing
Continuous Air Barrier
Water Barrier
1/2" Exterior Gypsum Board
Metal Lathe
Stucco Finish
Drainage Plane
3" EPS Insulation

WINDOWS

ALPEN TYROL TILT-TURN WINDOWS



SOLAR HEAT GAIN COEFFICIENT
SOUTH FACING WINDOWS: 0.5
WEST FACING WINDOWS: 0.3



Scale 3"=1' DETAIL 1 HEAD JAMB
Custom ALPEN Tyrol Tilt Turn Window

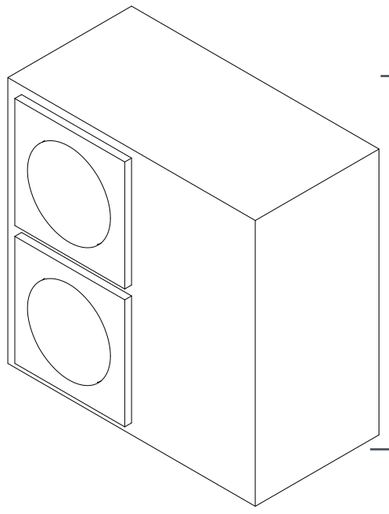
Scale 3"=1' DETAIL 2 SILL
Custom ALPEN Tyrol Tilt Turn Window

RADIANT SYSTEM

Roughly **40%** more efficient than conventional HVAC

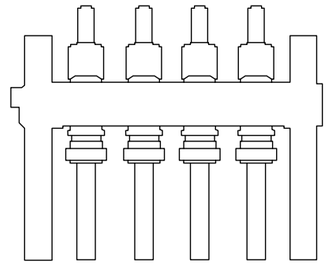
Chiltrix

Heat Pump



Buffer Tank

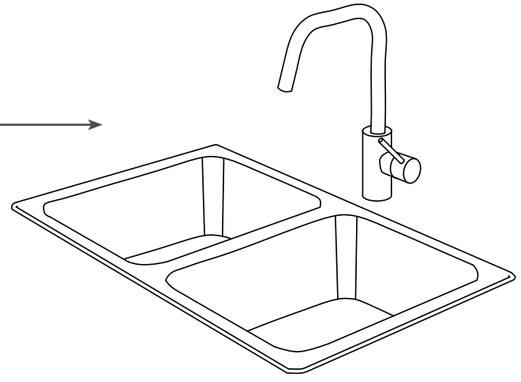
Radiant Manifold



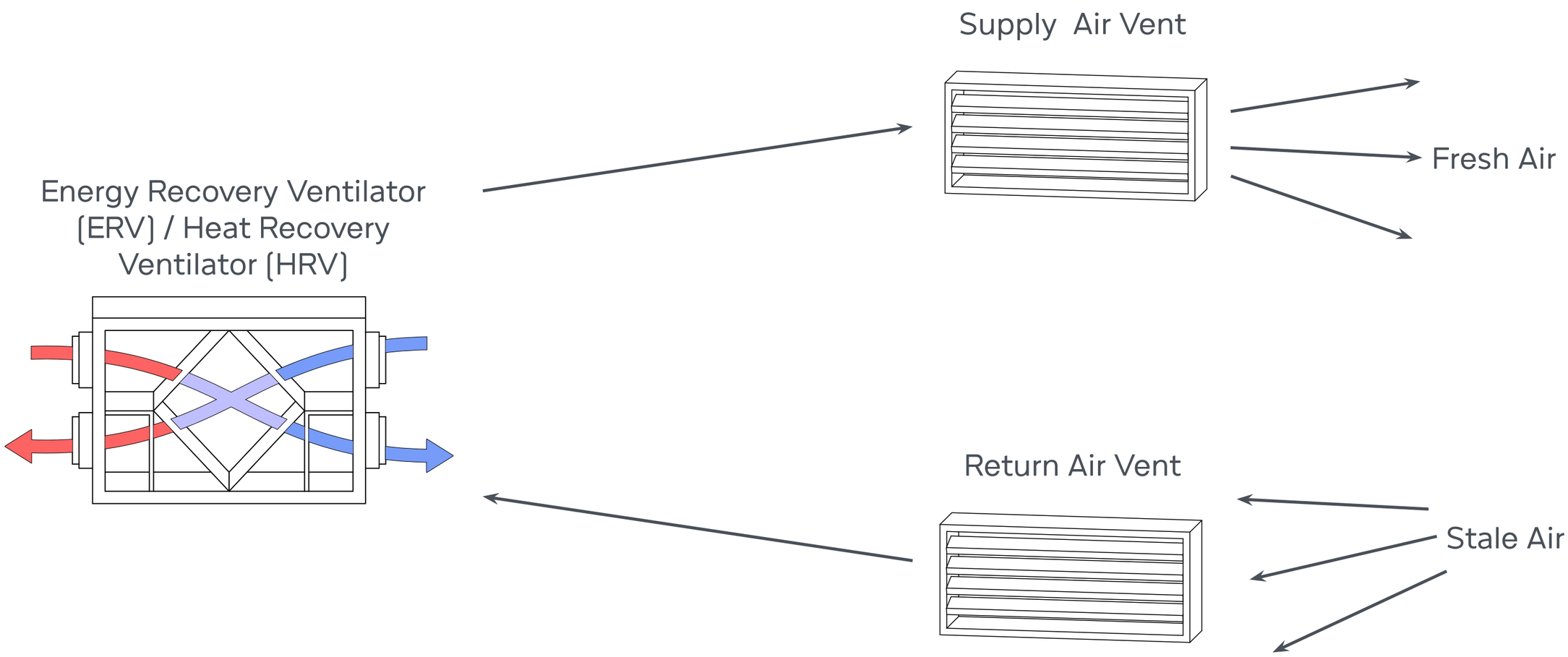
Zoned Radiant Flooring

Domestic Hot Water

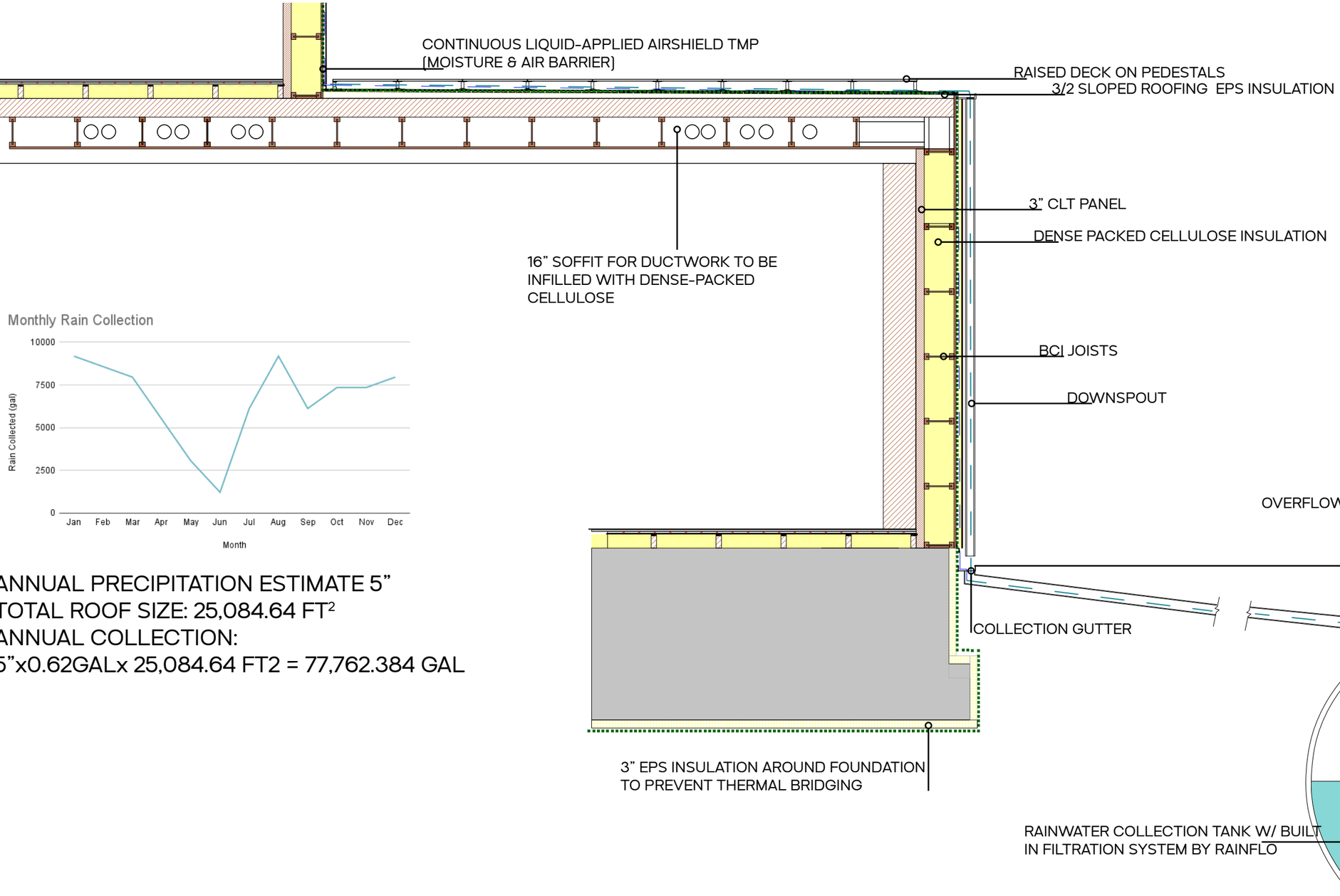
Usable Water



VENTILATION



RAINWATER COLLECTION



ANNUAL PRECIPITATION ESTIMATE 5"
TOTAL ROOF SIZE: 25,084.64 FT^2
ANNUAL COLLECTION:
5"x0.62GALx 25,084.64 FT2 = 77,762.384 GAL

BUDGET

Site Work
$9,278.39

Foundation
$81,248.57

Specialties
$227,235.95

Framing
$1,906,830.32

Interior Wall Insulation/Doors
$43,846.00

Electrical
$109,701.18

Windows
$214,464.40

Roofing
$1,881,348.00

Mechanical
$1,036,328.32

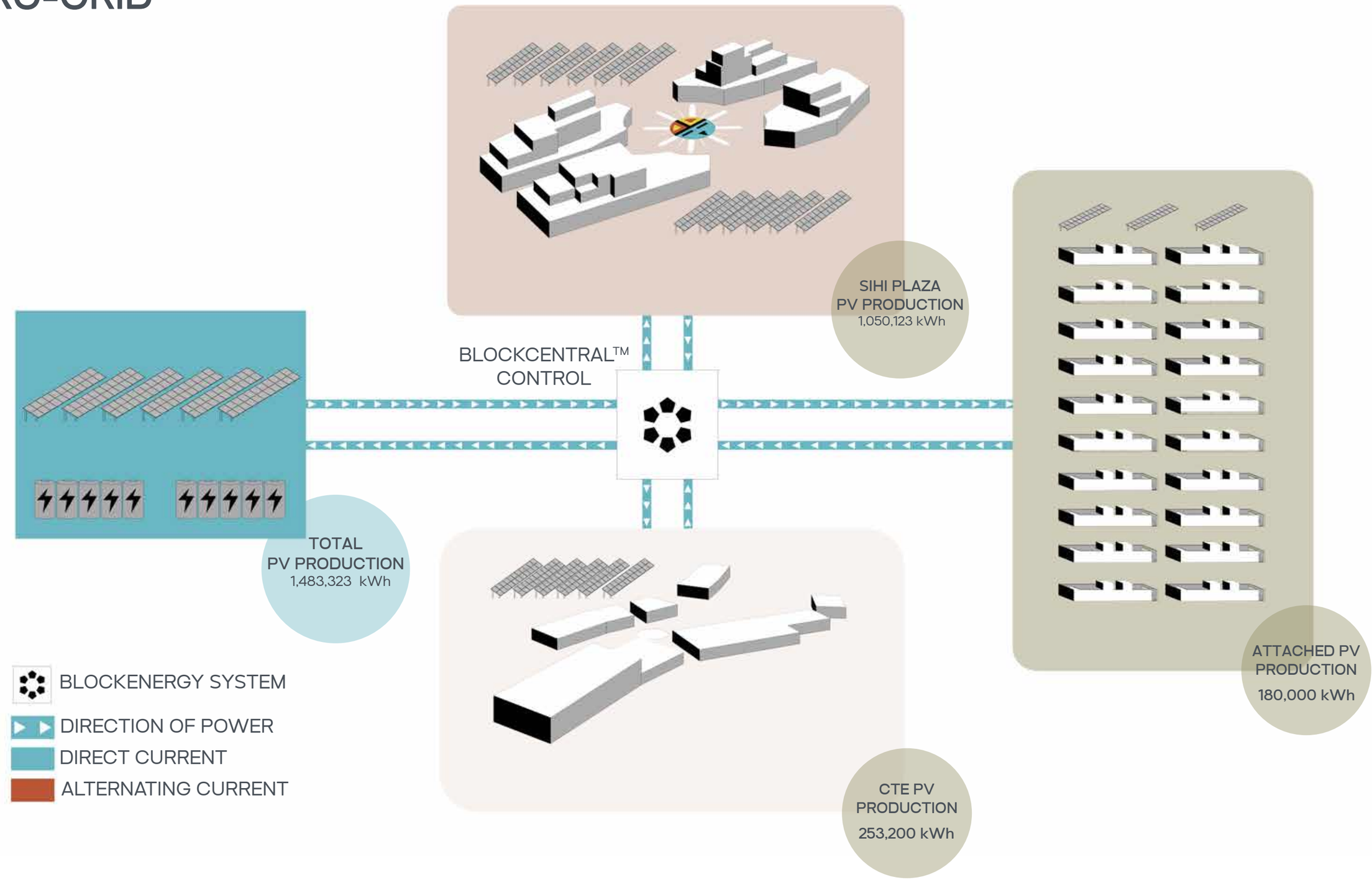
Overhead
$401,734.81

Furniture
$52,751.89

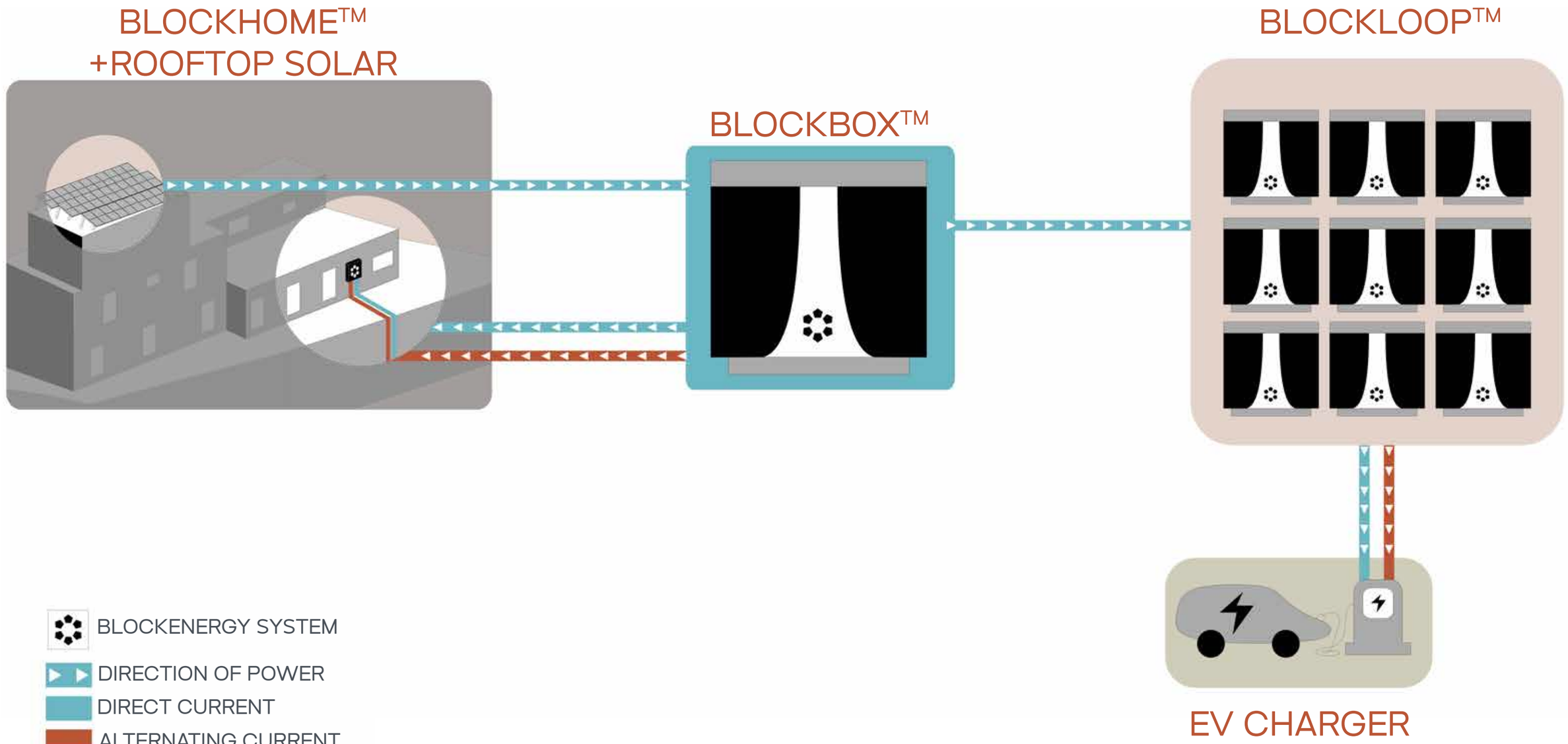
TOTAL

Estimated Total Building Cost	$5,964,767.82
*Estimated Building Cost Post-Covid	$11,929,535.64
*Estimated Labor Cost	$4,771,814.26
Total Building Cost with Estimated Labor Post Covid	**$16,701,349.90**
	$408.96 per sq.ft

MICRO-GRID


SIHI PLAZA
PV PRODUCTION
1,050,123 kWh
BLOCKCENTRAL™
CONTROL
TOTAL
PV PRODUCTION
1,483,323 kWh
ATTACHED PV
PRODUCTION
180,000 kWh
CTE PV
PRODUCTION
253,200 kWh
BLOCKENERGY SYSTEM
DIRECTION OF POWER
DIRECT CURRENT
ALTERNATING CURRENT

MICRO-GRID


BLOCKHOME™
+ROOFTOP SOLAR
BLOCKBOX™
BLOCKLOOP™
EV CHARGER
BLOCKENERGY SYSTEM
DIRECTION OF POWER
DIRECT CURRENT
ALTERNATING CURRENT

ENERGY USE INTENSITY

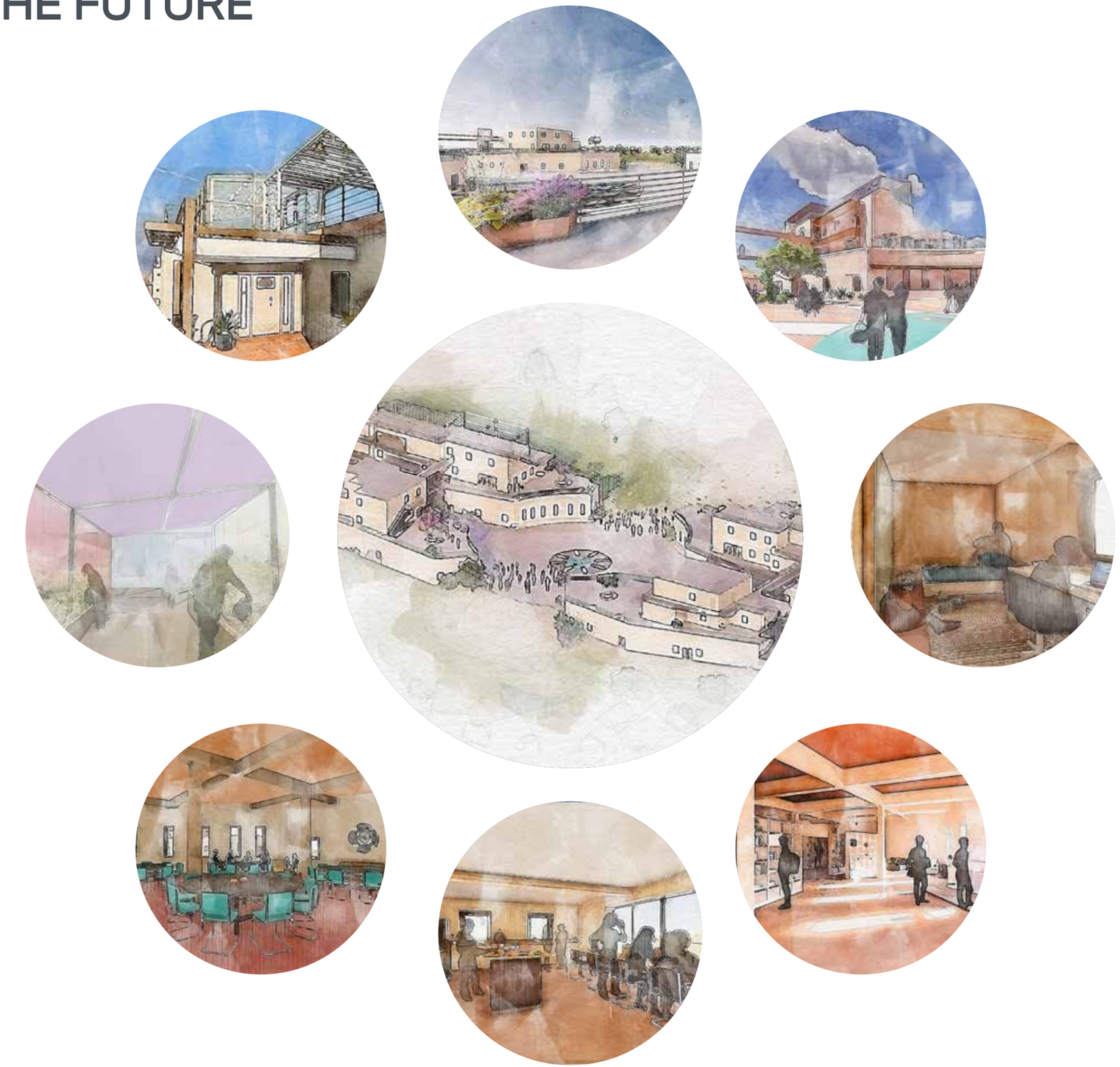
SIHI PLAZA
PV PRODUCTION
1,050,123 kWh

ANNUAL USAGE
137,230 kWh

TOTAL

PV PRODUCTION NET GAIN	-912,893 kWh
kBTUs	-3,119,146
TOTAL SQ FT	35,145FT²
EUI	**-88 kBTUs/FT²**
HERS	**-8**

LOOKING TO THE FUTURE



WATER ENERGY SOVEREIGNTY COMMUNITY STEWARDSHIP GROWTH RESILIENCE HEALTH FAMILY

ACKNOWLEDGMENTS

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THE HOPI TRIBE

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Hopi Guide

PARTNERSHIPS

Natasha Winnik
Originate
Tucson, AZ
Materials Selection

Roy Otterbein P.E.
Otterbein Engineering
Engineering Consultant

Chiltrix

TIMBER AGE SYSTEMS

BLOCKENERGY™

ALPEN
HIGH PERFORMANCE PRODUCTS

Thank You!