ALLENSWORTH PASSAGE

THE VISION

Our vision for Allensworth Passage is to create a place that is resilient in its form and performance, allowed for future growth and expansion, but most of all, celebrate and showcase the important history of this site and how that history informs future innovation. To support this vision we have focused our design goals to 3 categories: Resiliency, Celebration, and Growth.

RESILIENCY

By focusing on resiliency, the design solution is providing a strong foundation and protecting its future performance. Our design solution is resilient in its site design against threats of natural disaster and climate change. It is resilient in its building infrastructure against threats of utilities disconnection. It is resilient is its community against threats of displacement and isolation during times of disaster, and it is resilient in its operation and programming against threats of economic instability.

CELEBRATION

The history of Allensworth deserves to be highlighted. There is a legacy to uphold but there is also opportunity to celebrate the achievements of current work that will inspire future innovation. Our design solution provides spatial opportunities to highlight culture and art by allocating exterior and interior walls to display local art, achievements, and regional history. The design solution also allows for places for gathering for the local community as well as members of the industry to share ideas and foster a culture of discovery and delight. The boundaries between the enclosed rooms and outdoor courtyards are blurred to celebrate the idea that agricultural education doesn't have to remain within the walls of a room and that the classroom is as much outdoors as it is indoors.

GROWTH

There cannot be sustainability without planning for future needs, growth, and expansion. By providing space to expand for future construction and creating flexible architecture where spaces can reduce and expand based on need, our design solution is strengthened by adaptability. Growth also takes into account the opportunity to expand on diverse services and program to adapt to a changing economy. The diversified program can create more streams of revenue on site and expand on tourism in the area.

THE BUILT FORM

Our design solution went through an evolution in form as we explored how this destination would be sited, its relationship to the street, its relationship to the indoors and outdoors, the connection between the educational and the agricultural program, and the efficiency of enclosed space to non enclosed space. The following are the design features that support our vision for Resilience, Celebration, and Growth:

Raised Platform

Built up platform raised above the site to mitigate the risk and damages of flooding on the built environment, but also as a concept that only the landscape and agricultrial elements take root in the soil and the built environment is just a light touch on the surface of the site.

Destination

Destination at the terminus of the existing Young Road which we deemed as an important artery to the community of Allensworth. Our design extends Young Road as a main pedestrian pathway through our site.

Porches

Porches that provide shelter and protection, visual connection to other buildings, courtyards, and streets, and places for community learning and gathering.

Breezeways

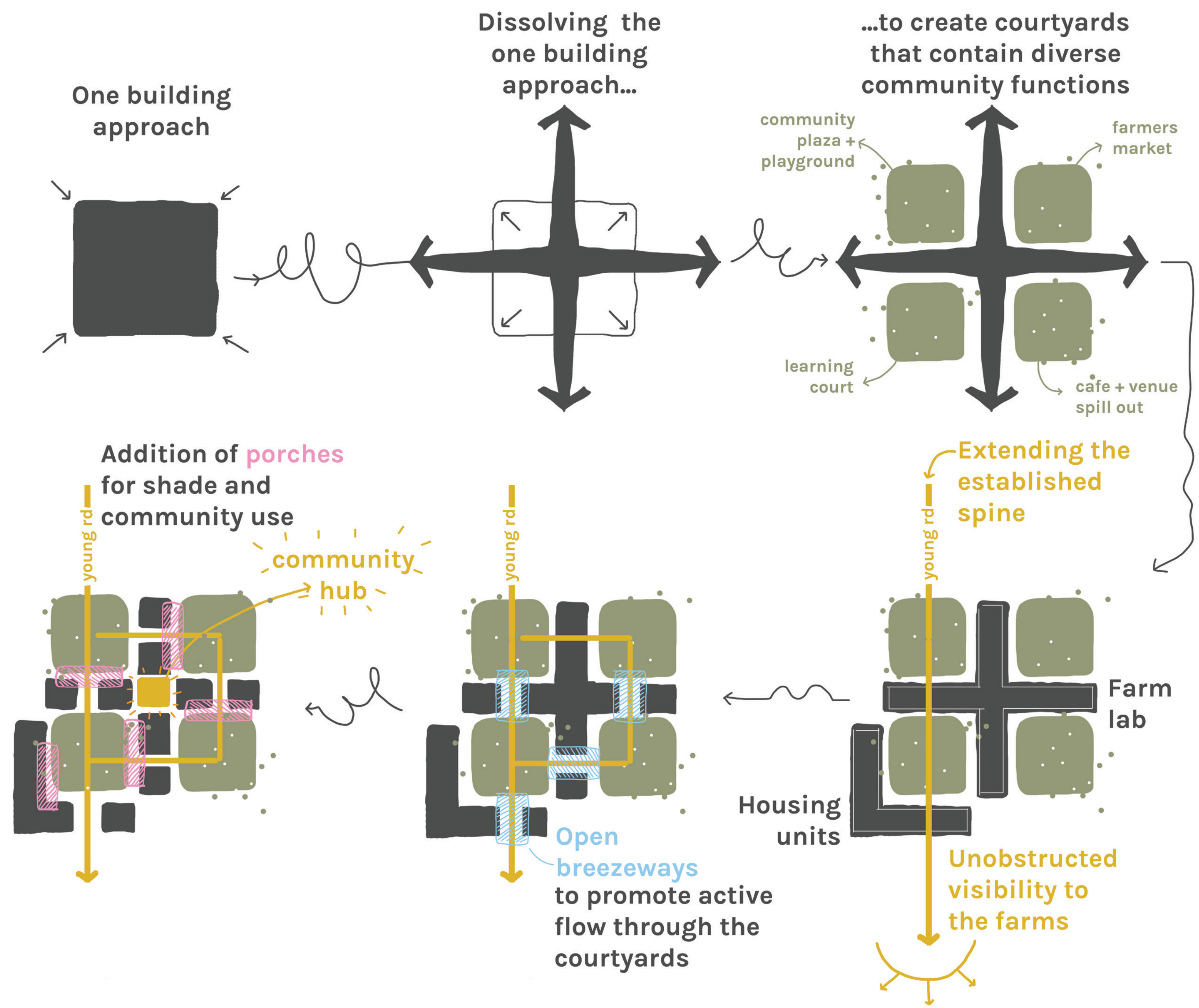
Breezeways that provide permeable hallways for daylight and breeze, and walls for display of art, history, and achievements.

Courtyards

Courtyards that provide connection to the outdoors, places for play and community gathering.

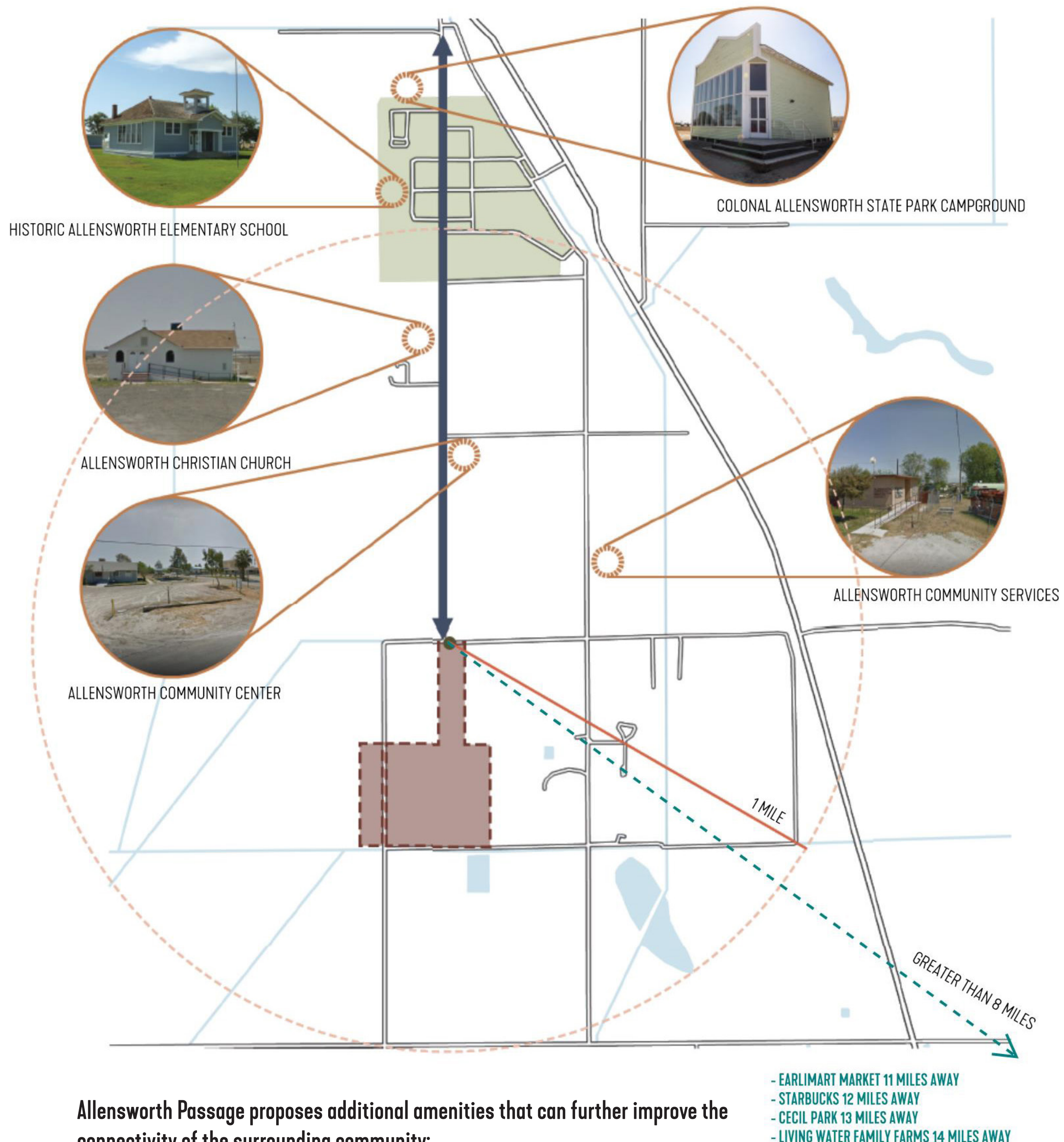
Future Growth

The goal is to provide space for physical expansion, future growth and construction, flexibility in the architecture to extend indoor spaces to outdoor spaces, and opportunities to expand on existing program to support entrepreneurship to sustain the community for future needs and strengthen adaptability.



COMMUNITY AMENITIES

The community of Allensworth has some existing amenities that contribute to the education, wellness, and connectivity of the region. These key landmarks include:



Allensworth Passage proposes additional amenities that can further improve the connectivity of the surrounding community:

+ General Store
+ Cafe
+ Green Space / Playground
+ Farmer's Market

OVERALL PROJECT SITE

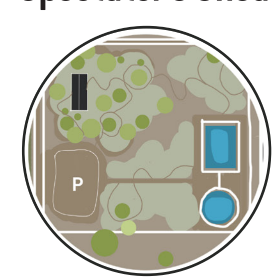
Beyond the built site, our design solution proposes a wholistic visitor experience that encompasses the larger project site. This can serve as an educational tour that informs visitors of how the center operates and the various innovative technologies used on site.

OVERALL SITE PLAN KEY

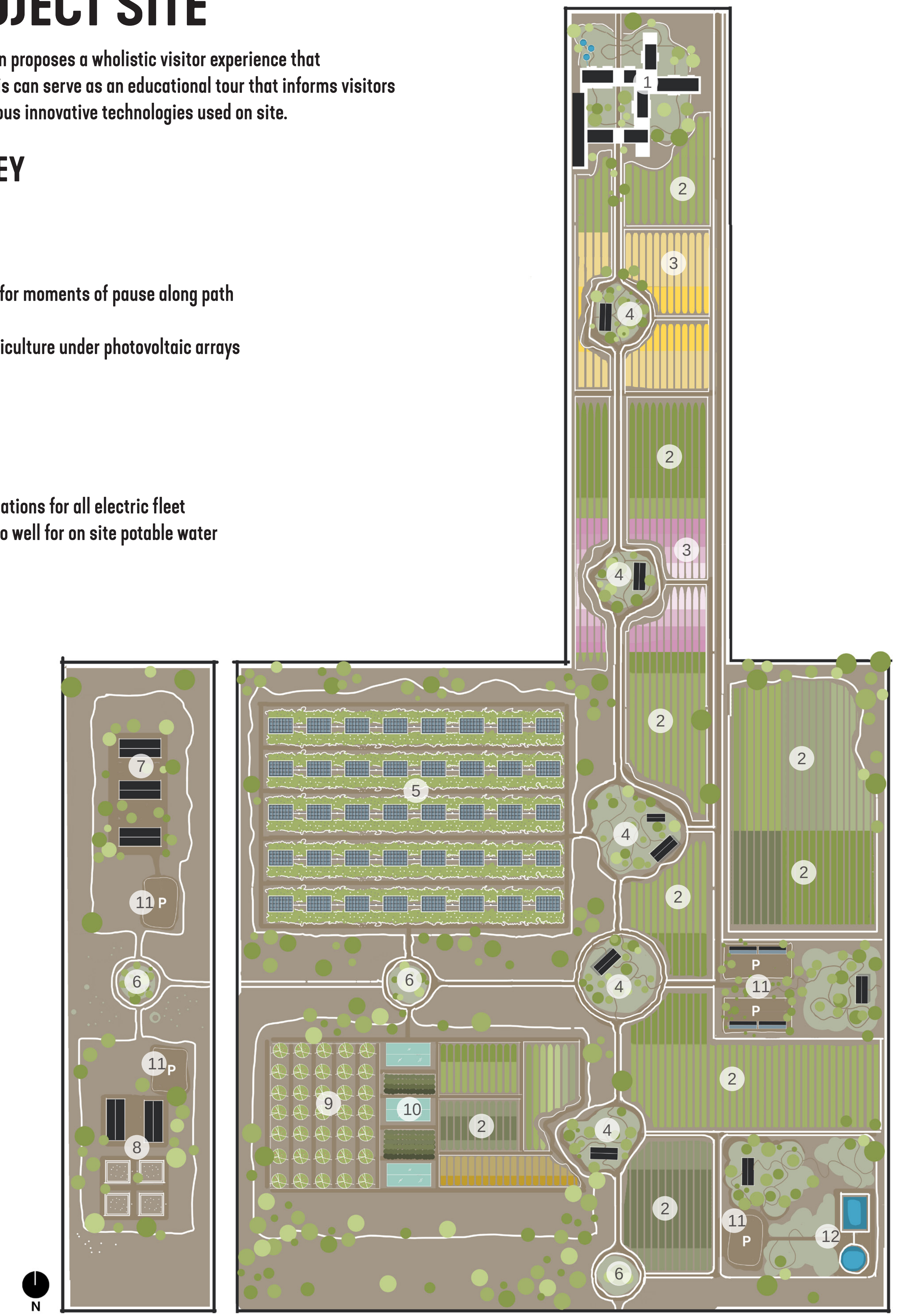
1. Allensworth Passage
2. Row Crops
3. Seasonal Flower Fields
4. Spectator's Shed - Covered canopy for moments of pause along path and includes local art displays
5. Agrovoltaics - for partly shaded agriculture under photovoltaic arrays
6. Roundabout/traffic circle
7. Vermiculture and Composting
8. Rabbit Farming
9. Orchard
10. Greenhouse
11. Farm Fleet Parking with charging stations for all electric fleet
12. Water treatment located adjacent to well for on site potable water

Destination

Spectator's Shed



Micro-Projects



DESIGN FEATURES

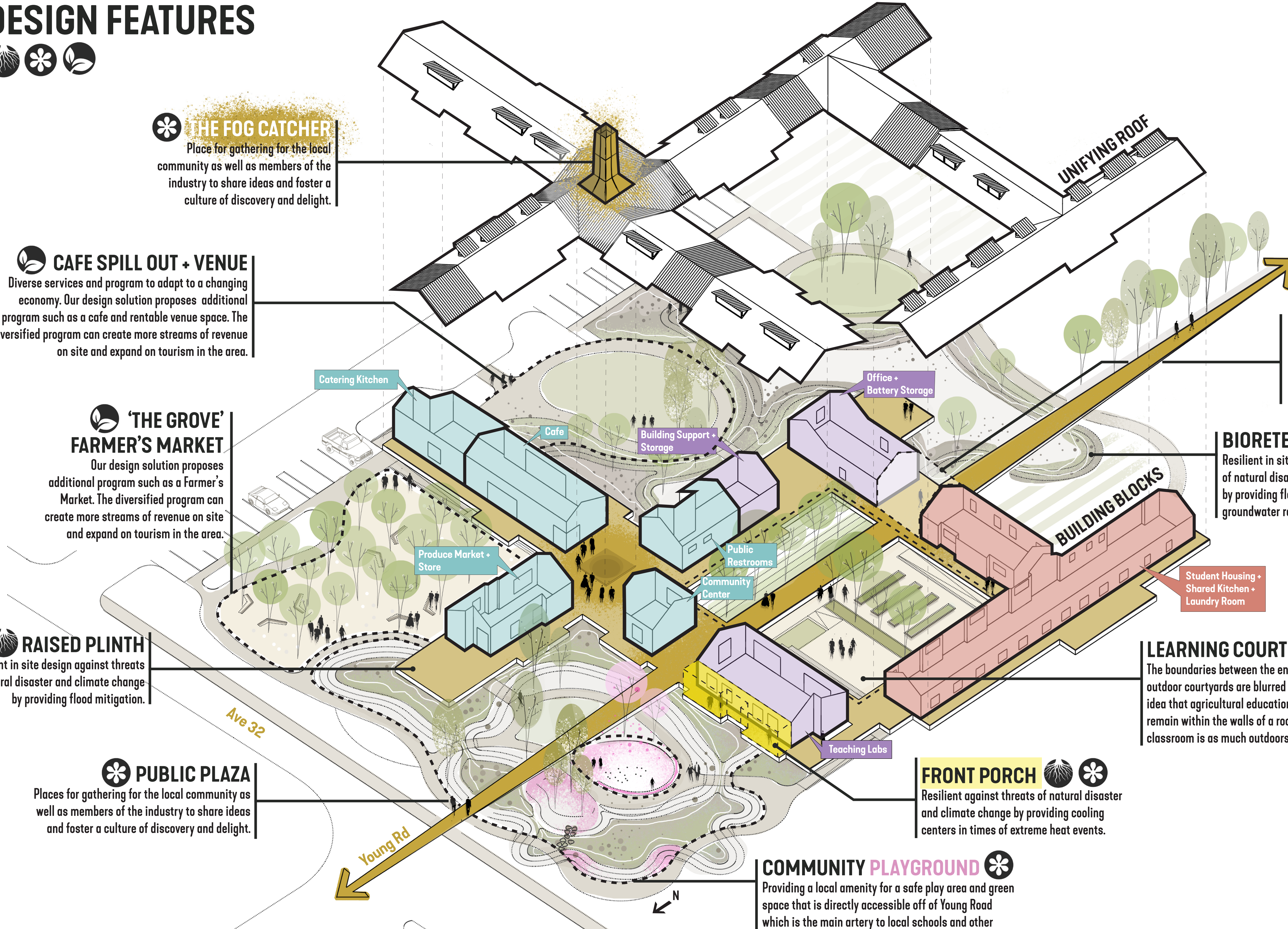
THE FOG CATCHER
Place for gathering for the local community as well as members of the industry to share ideas and foster a culture of discovery and delight.

CAFE SPILL OUT + VENUE
Diverse services and program to adapt to a changing economy. Our design solution proposes additional program such as a cafe and rentable venue space. The diversified program can create more streams of revenue on site and expand on tourism in the area.

'THE GROVE' FARMER'S MARKET
Our design solution proposes additional program such as a Farmer's Market. The diversified program can create more streams of revenue on site and expand on tourism in the area.

RAISED PLINTH
Resilient in site design against threats of natural disaster and climate change by providing flood mitigation.

PUBLIC PLAZA
Places for gathering for the local community as well as members of the industry to share ideas and foster a culture of discovery and delight.



BREEZEWAYS
Spatial opportunities to highlight culture and art by allocating exterior walls to display local art, achievements, and regional history.

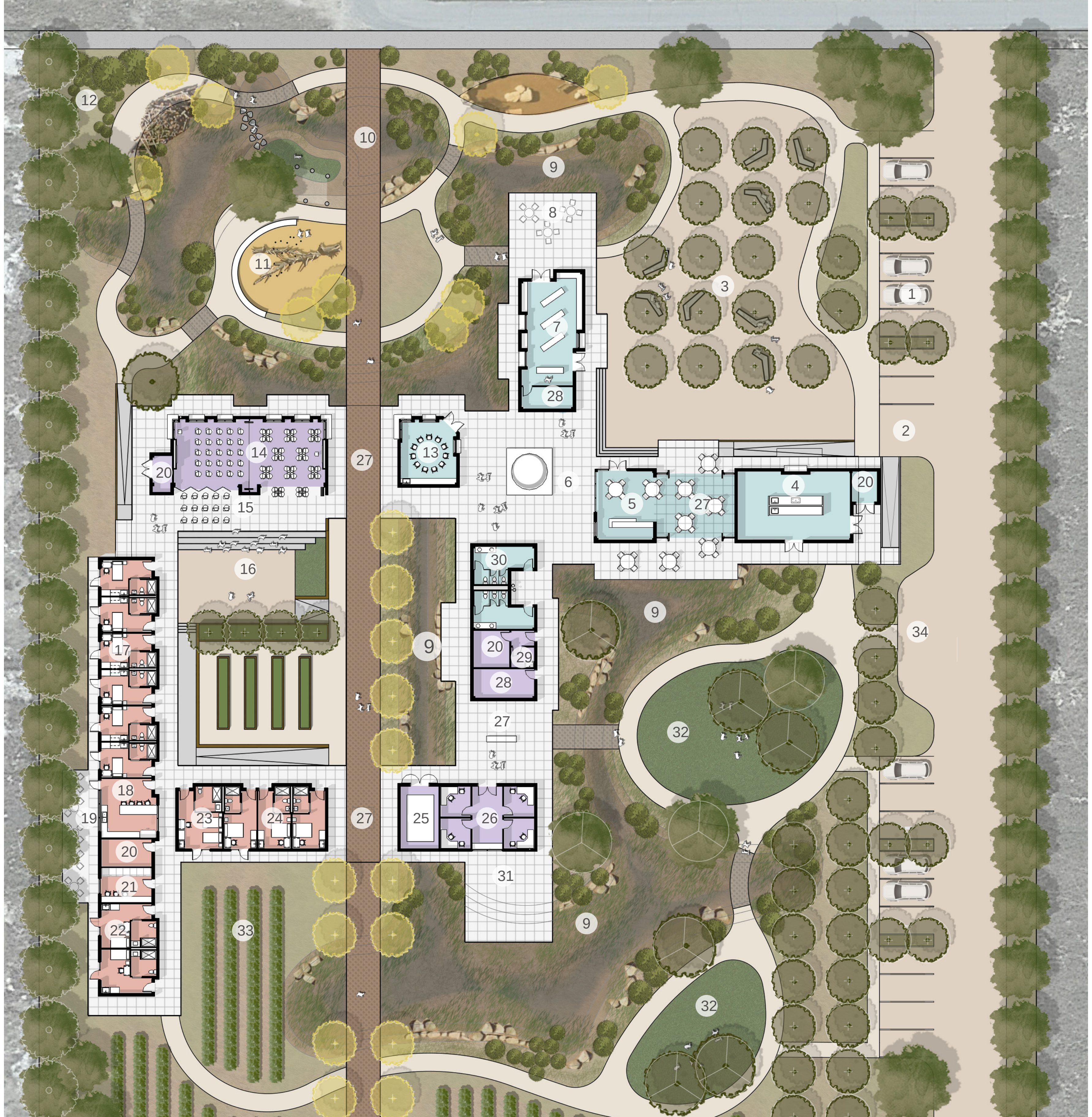
BIORETENTION
Resilient in site design against threats of natural disaster and climate change by providing flood mitigation and groundwater recharge.

LEARNING COURTYARD
The boundaries between the enclosed rooms and outdoor courtyards are blurred to celebrate the idea that agricultural education doesn't have to remain within the walls of a room and that the classroom is as much outdoors as it is indoors.

FRONT PORCH
Resilient against threats of natural disaster and climate change by providing cooling centers in times of extreme heat events.

COMMUNITY PLAYGROUND
Providing a local amenity for a safe play area and green space that is directly accessible off of Young Road which is the main artery to local schools and other community resources.

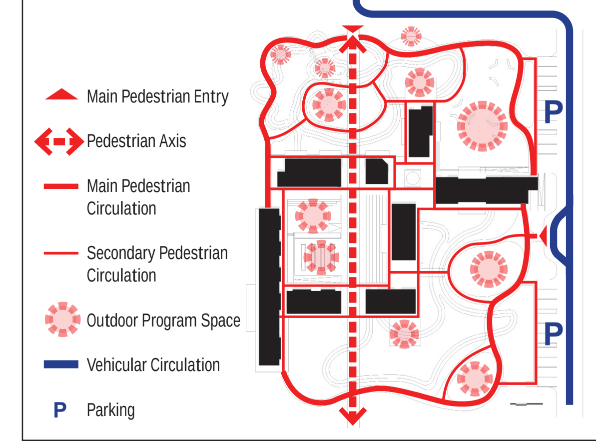
ENLARGED SITE PLAN



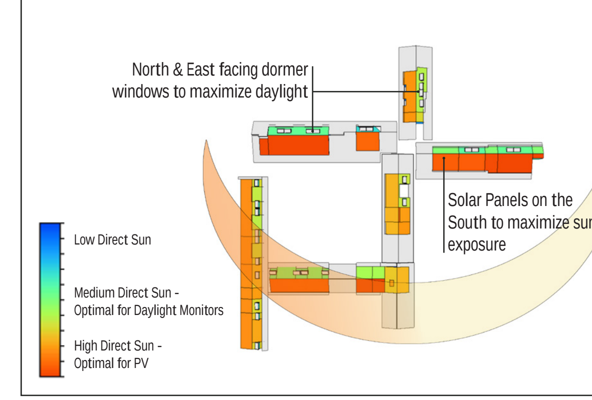
KEY

1. Parking - 20 spots total with electric vehicle charging stations
2. Loading Area - For loading and unloading at the General Store, farmer's market, cafe and catering kitchen
3. The Grove Farmer's Market - a shaded outdoor area dedicated to the Farmer's Market located adjacent to the general store and the cafe and kitchen
4. Catering Kitchen - 800 sf
5. Cafe - 400 sf with exterior seating to the south for visitors to enjoy light refreshments
6. Community Hub - Protected central courtyard centered around a fog catcher water feature. Exterior walls showcase site history and community postings
7. General Store - 640 sf includes produce market and convenience store
8. Store Expansion - exterior expansion of the general store
9. Bioretention Area- flooding mitigation and groundwater recharge
10. Pedestrian Axis - Extension of Young Road through the project site
11. Playground - community amenity
12. Windbreak grove for dust mitigation
13. Community Center - 350 sf serves as a multipurpose room
14. Teaching Lab - 1000 sf can be split into (2) 500 sf classrooms
15. Teaching Lab Expansion - expands into an outdoor classroom
16. Learning Courtyard - outdoor space with raised planters to aid in educational demonstrations with amphitheater seat steps
17. Standard Student Housing Unit - (6) 150 sf unit, toilet at 45 sf each
18. Shared Kitchen - 340 sf
19. Shared Outdoor Dining
20. Utility Closet - varies in sf
21. Shared Laundry - 190 sf
22. Accessible Student Housing Unit - (2) 175 sf each unit, toilet at 70 sf each
23. Accessible Guest Housing Unit - (1) 200 sf unit, toilet at 70 sf
24. Standard Guest Housing Unit - (3) 160 sf unit, toilet at 45 sf each
25. Battery Storage - 260 sf
26. Offices - (4) 100 sf each
27. Typical Breezeway
28. Storage - varies in sf
29. Housekeeping Closet - 50 sf
30. Restrooms - (2) 200 sf each
31. Vantage Point - Covered deck to view south towards agricultural fields
32. Venue Space - rentable to public
33. Row Crops

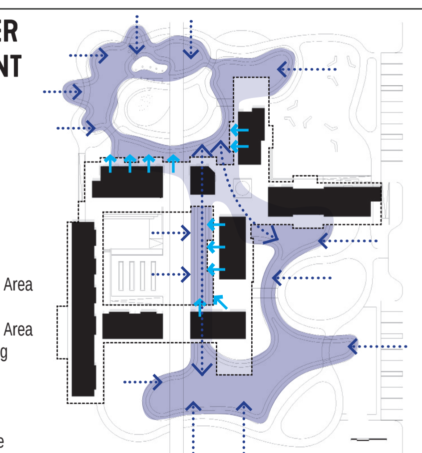
SITE CIRCULATION



SOLAR RADIATION

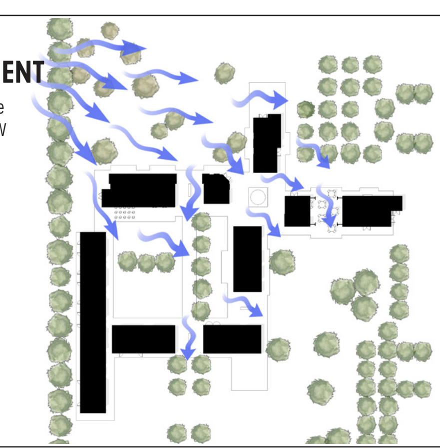


STORMWATER MANAGEMENT



WIND MANAGEMENT

Prevailing day time winds from the NW addressed by windbreak grove



Community Hub


The Breezeway Experience

The Porch Experience

Learning Courtyard

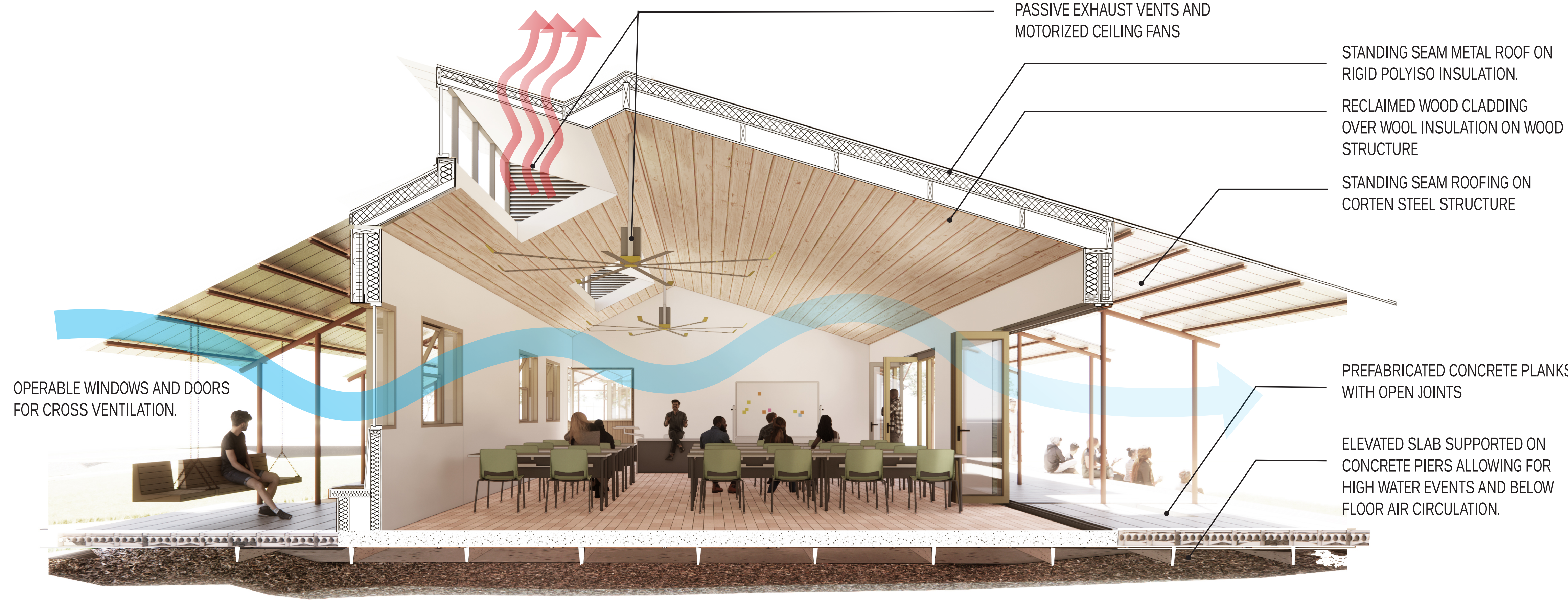
Farmer's Market


Playground

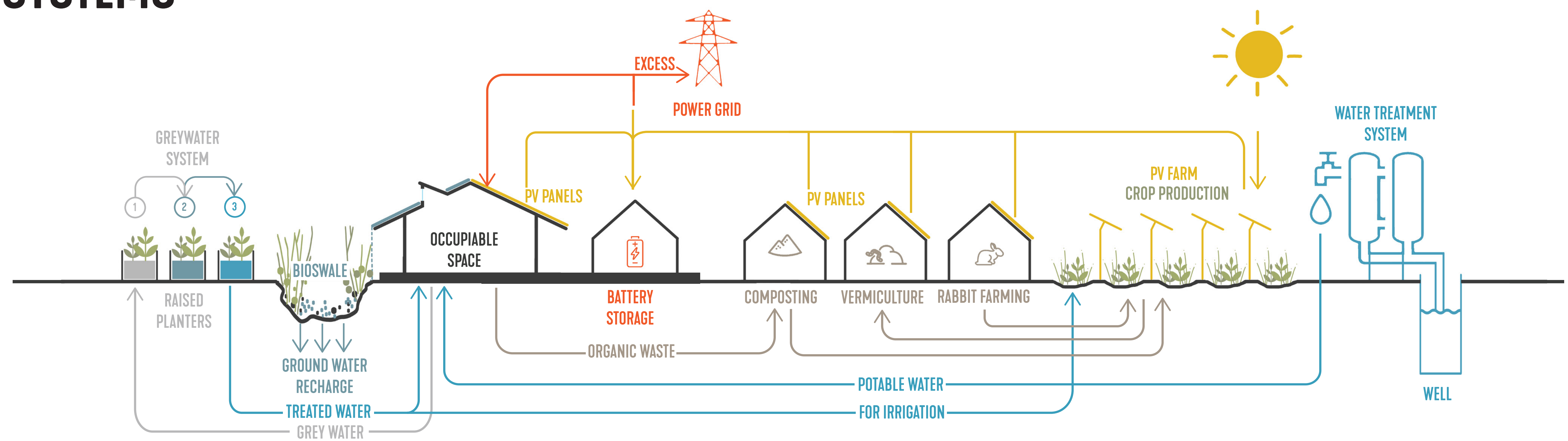
Cafe


The Vantage Point

ILLUSTRATED SECTION



SITE SYSTEMS



MECHANICAL SYSTEM SUMMARY

The goal of the project is to reduce as much demand as possible using passive design features. Then, use an efficient HVAC system to reduce building annual energy consumption. Later, renewable energy is used to offset the building energy consumption to achieve net zero.

Load Reduction:
Massing & Orientation: The classrooms, community center, café, and housing units are located on the EW axis to avoid extreme heat gain. Restrooms and other service areas are located on the west side to block heat gain to the housing and classroom units. Extensive shading is provided on all sides to reduce heat gain, glare and enhance visual and occupant comfort.

Improved Building Envelope: The wall, roof, and window thermal performance exceed T24 prescriptive requirements. The improved envelope minimizes heat gain and improves thermal comfort.

Reduced lighting power: All LED lights with daylight harvesting and enhanced automatic lighting shutoff controls adjust the LED output based on daylight availability. Daylight in the space is controlled to different Foot candle levels based on different spaces on IES standards. The shutoff controls automatically turn off LED lights when there is no occupancy.

Natural Ventilation: Windows are carefully placed considering the predominant wind direction. The housing unit has operable windows on the east side to bring in cool air and vents near the roof on the west side to exhaust the hot air. Similarly, classrooms ad community center has windows in 2 directions for cross ventilation. The natural ventilation is assumed between 55F - 75F outdoor air temperature.

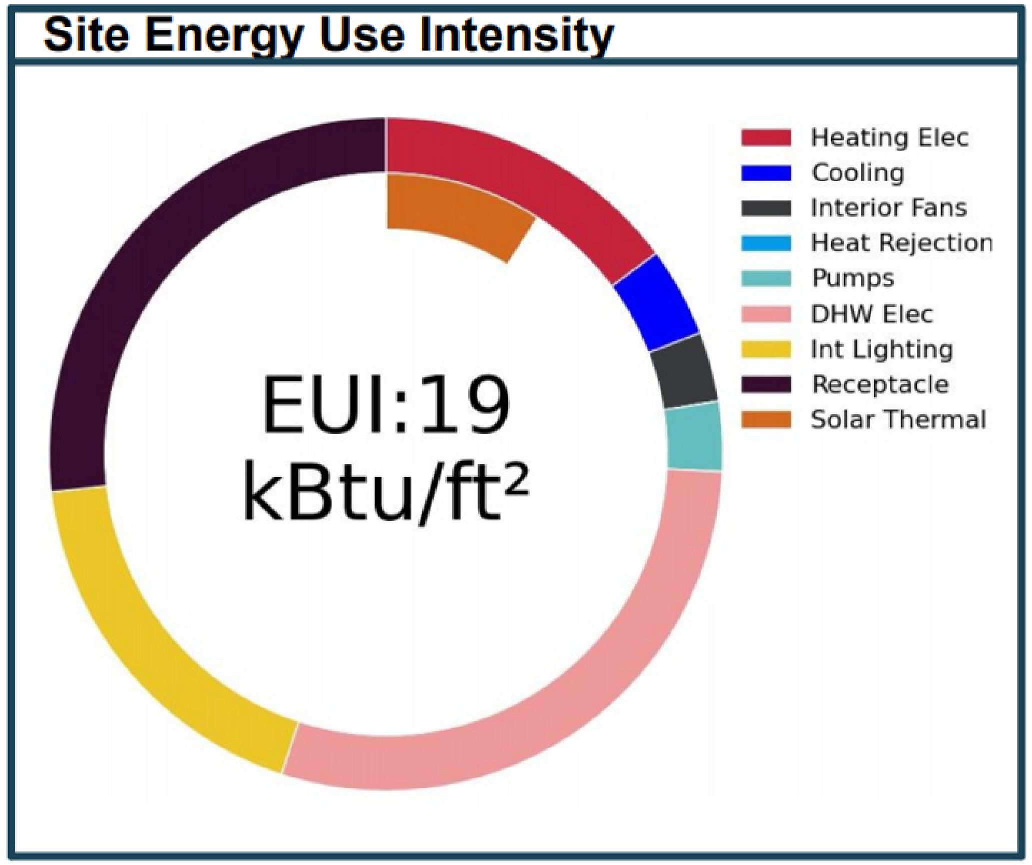
Ceiling Fans: Ceiling fans are used everywhere to promote air movement to enhance occupant comfort in this desert area

A combination of the above strategies reduces the overall load of the building. The load reduction will help downsize the HVAC system and corresponding energy.

Efficient System: All electric system is used.
HVAC System: A water Source Variable refringent Flow (VRF) system with heat exchange to the ground source loop is used to provide cooling and heating to the building. The Mitsubishi heat recovery water source unit PQRY system with an efficiency of EER-20, IEER -28, and heating COP-6 is used for the analysis. The heat recovery component will recover heat from spaces that are in cooling mode and use it for spaces that are in the heating model and vice versa, further increasing efficiency and reducing energy consumption.

Domestic hot water: Domestic hot water is the second-highest energy component. A solar hot water heating system is used to preheat the incoming water. A flat panel type solar water system installed over 600 SF area is assumed. A highly efficient CO2 heat pump water heater with an efficiency of COP-4.5 is used to generate hot water.

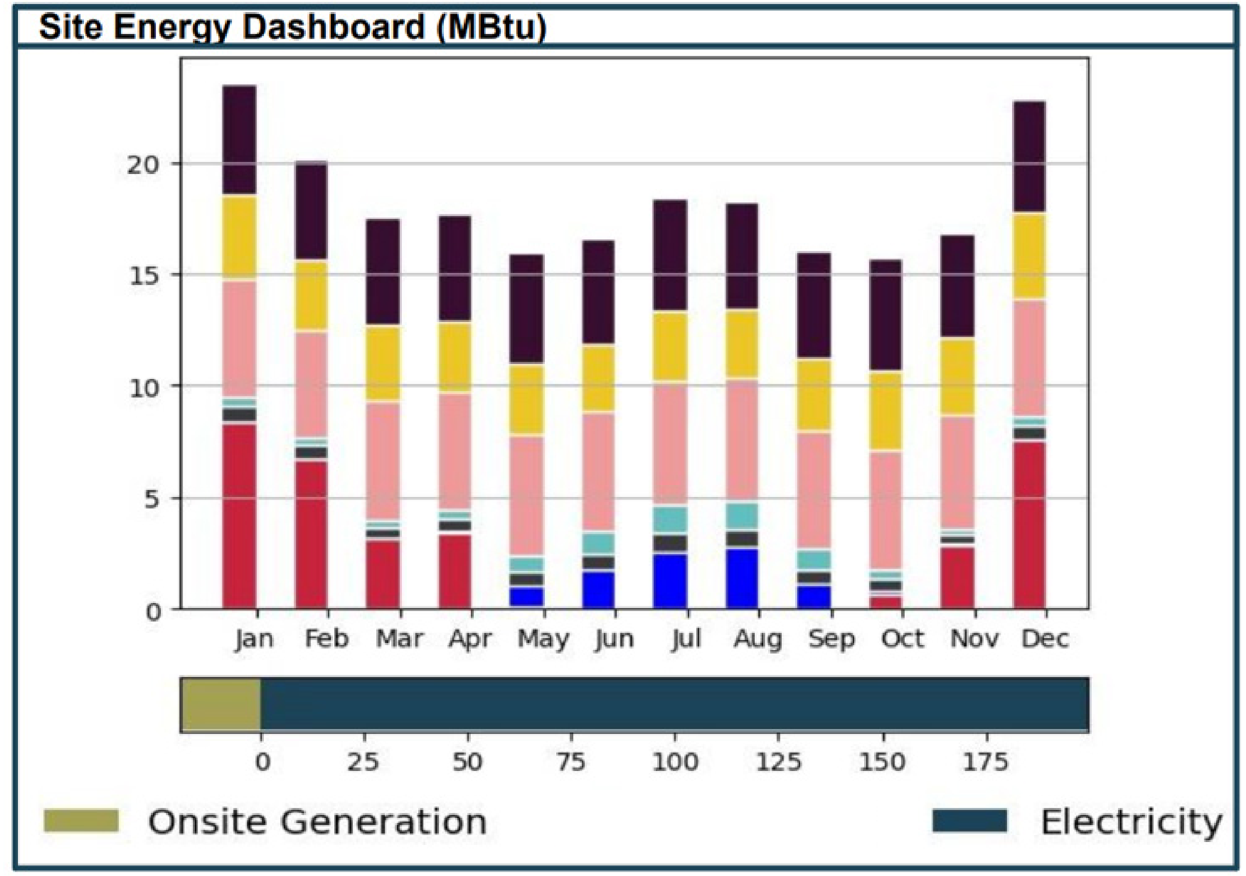
ANNUAL END USE SUMMARY



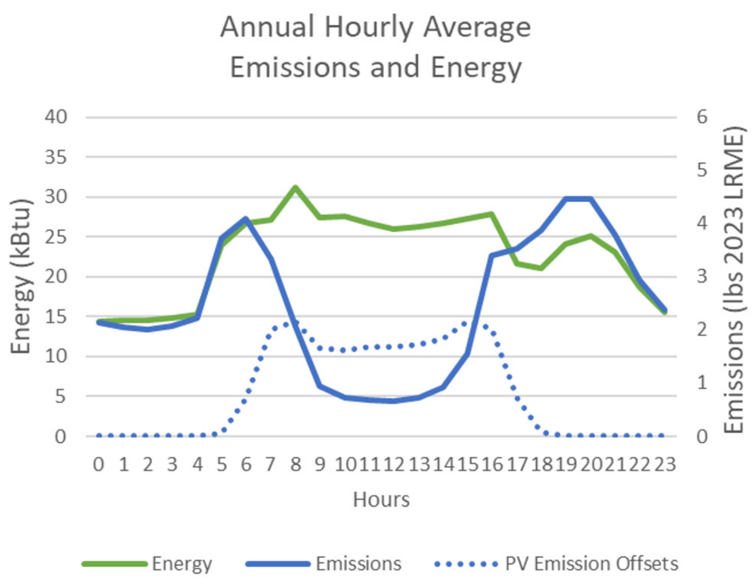
Annual Energy Consumption (kBtu/ft²/year) & CO_2 $KgCO_2/ft^2/yr$

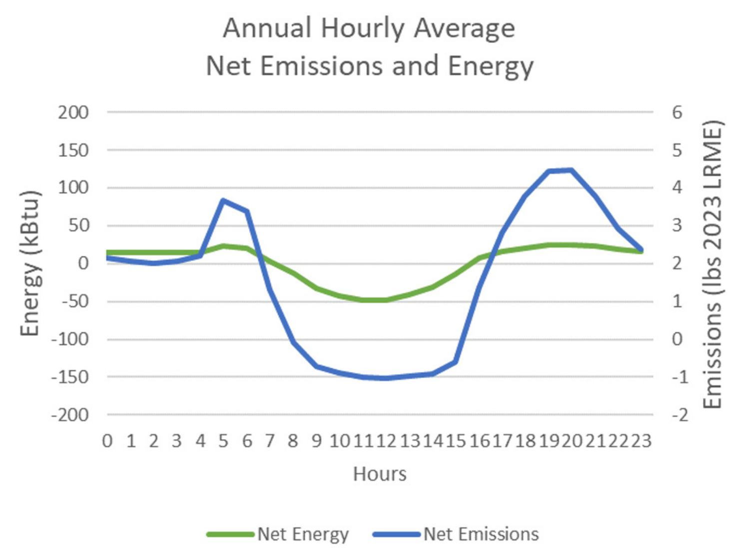
Energy End Use	Site Energy	Source Energy	CO2 Emissions
Heating Fossil Fuel	0.0	0.0	0.0
Heating Electricity	3.1	9.9	0.6
Space Cooling	0.9	2.9	0.2
Fans Interior	0.7	2.2	0.1
Heat Rejection	0.0	0.0	0.0
Pumps	0.7	2.3	0.1
DHW Fossil Fuel	0.0	0.0	0.0
DHW Electricity	6.1	19.1	1.1
Interior Lighting	3.8	12.0	0.7
Exterior Lighting	0.0	0.0	0.0
Receptacle	5.6	17.5	1.0
Data Center	0.0	0.0	0.0
Cooking Fossil Fuel	0.0	0.0	0.0
Cooking Electricity	0.0	0.0	0.0
Elevators & Escalators	0.0	0.0	0.0
Refrigeration	0.0	0.0	0.0
Process	0.0	0.0	0.0
TOTAL (ex renewables)	20	65	3

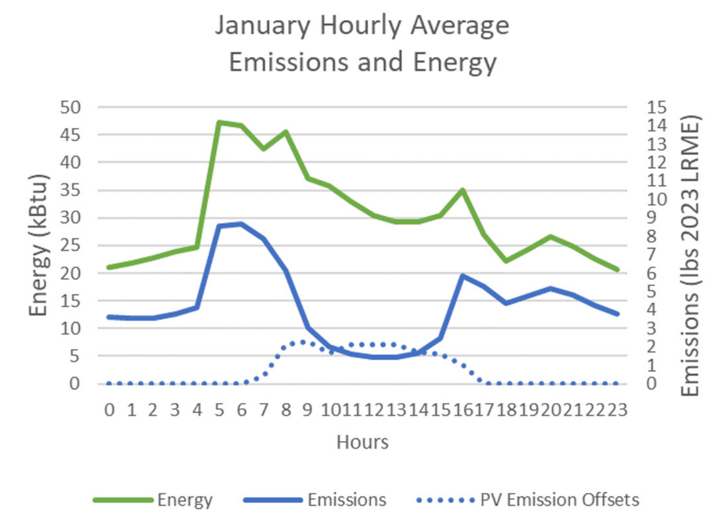
MONTHLY END USE ENERGY CONSUMPTION

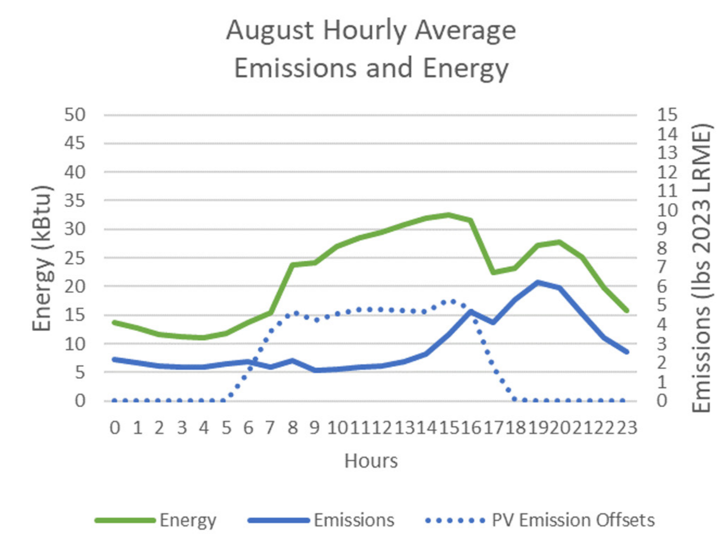


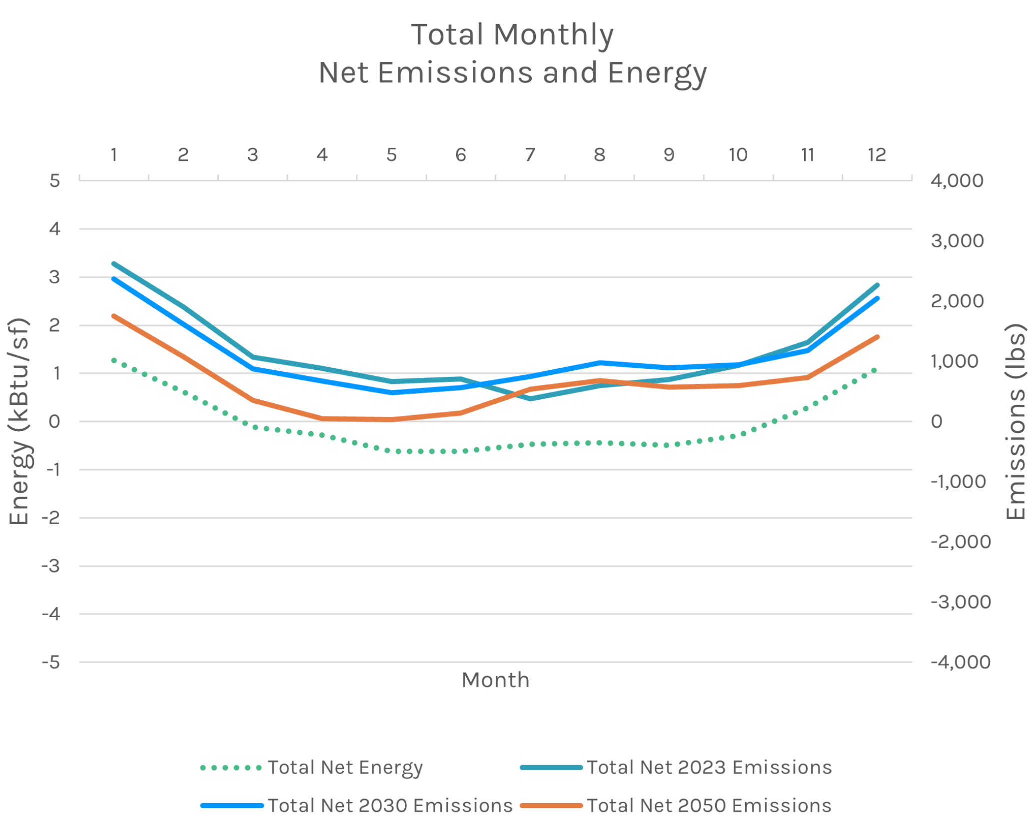
HOURLY LOAD SHAPES FOR ENERGY & EMISSIONS

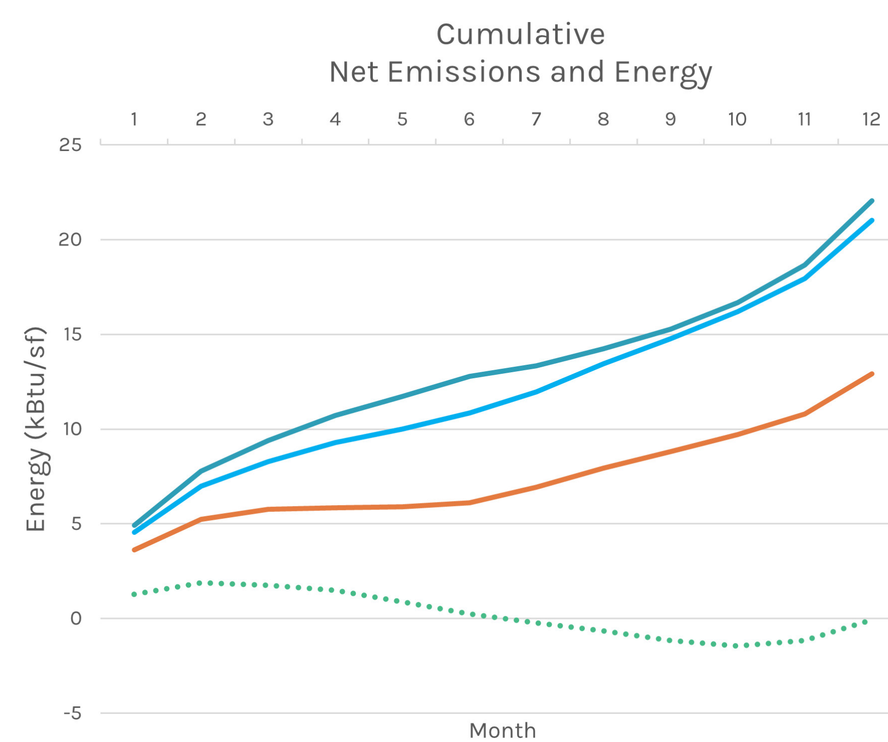












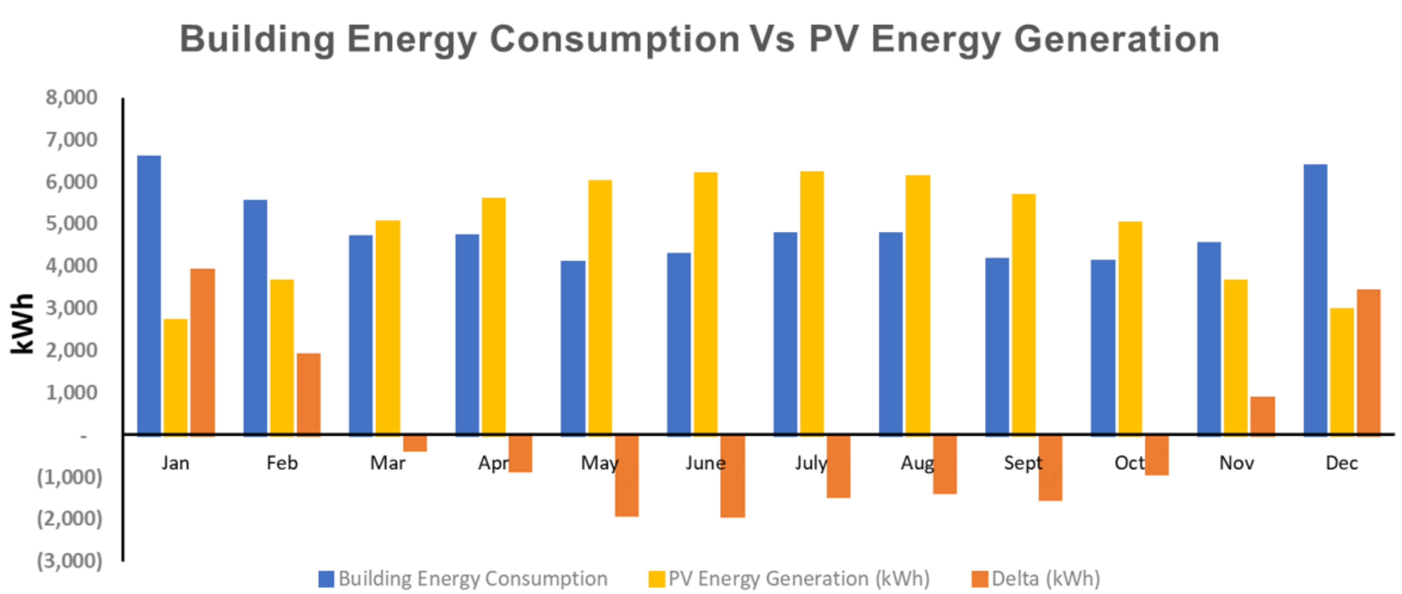
RENEWABLE ENERGY SYSTEM

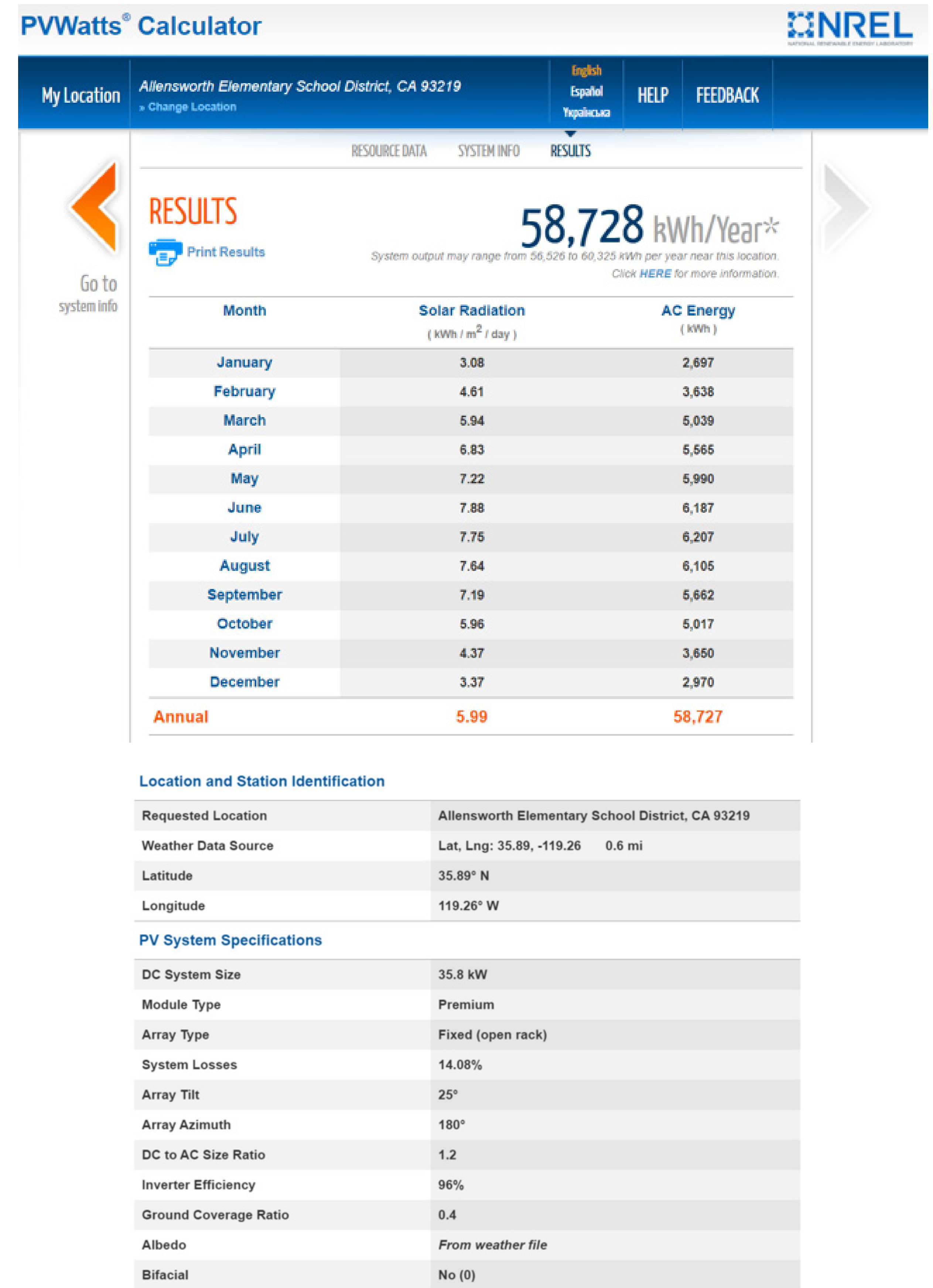
The annual energy consumption of the building is 58,520 kWH.
A PV array of ~ 36 KW is required to offset the entire budiing energy to achieve Net Zero Energy.

NREL's (National Renewable Energy Laboratory) PV watts was used to calculate the PV array size based on orientation and roof tilt.
Premium PV panels with approximately 22% efficiency was selected to be located on south facing roofs.

PV Array Size required to achieve Net Zero Energy = 36 KW
Annual Energy Generation from PV = 58,730 kWh
Minimum Required Roof Area for PV = 2,600 SF
Proposed Roof Area for PV SF: 4,300 SF

	Building Energy Consumption (kWh)	PV Energy Generation (kWh)	Delta (kWh)
Jan	6,584	2,697	3,887
Feb	5,519	3,638	1,880
Mar	4,687	5,039	(353)
Apr	4,711	5,565	(853)
May	4,093	5,990	(1,897)
June	4,267	6,187	(1,920)
July	4,769	6,207	(1,438)
Aug	4,749	6,105	(1,356)
Sept	4,146	5,662	(1,516)
Oct	4,106	5,017	(911)
Nov	4,522	3,650	872
Dec	6,364	2,970	3,394
Total	**58,516**	**58,728**	**(212)**





PVWatts® Calculator

NREL

My Location | Allensworth Elementary School District, CA 93219 » Change Location | English Español Українська | HELP | FEEDBACK

RESOURCE DATA | SYSTEM INFO | RESULTS

Go to system info

RESULTS

Print Results

58,728 kWh/Year*

System output may range from 56,526 to 60,325 kWh per year near this location. Click HERE for more information.

Month	Solar Radiation (kWh / m² / day)	AC Energy (kWh)
January	3.08	2,697
February	4.61	3,638
March	5.94	5,039
April	6.83	5,565
May	7.22	5,990
June	7.88	6,187
July	7.75	6,207
August	7.64	6,105
September	7.19	5,662
October	5.96	5,017
November	4.37	3,650
December	3.37	2,970
Annual	5.99	58,727

Location and Station Identification

Requested Location	Allensworth Elementary School District, CA 93219
Weather Data Source	Lat, Lng: 35.89, -119.26 0.6 mi
Latitude	35.89° N
Longitude	119.26° W

PV System Specifications

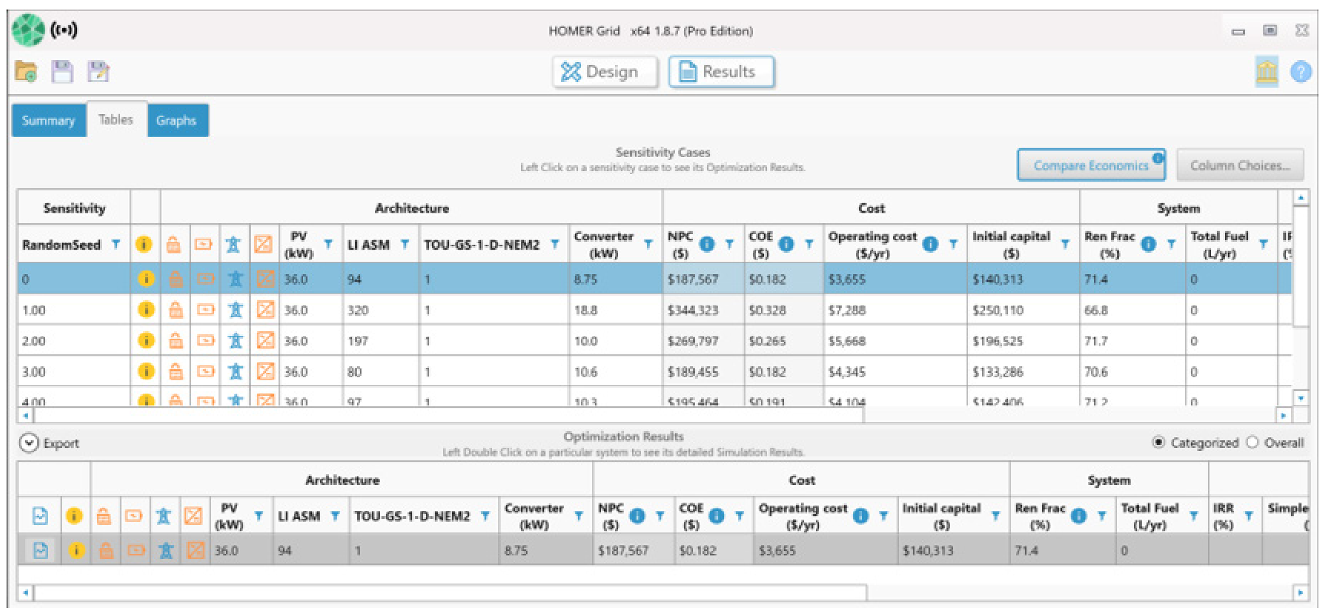
DC System Size	35.8 kW
Module Type	Premium
Array Type	Fixed (open rack)
System Losses	14.08%
Array Tilt	25°
Array Azimuth	180°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4
Albedo	*From weather file*
Bifacial	No (0)

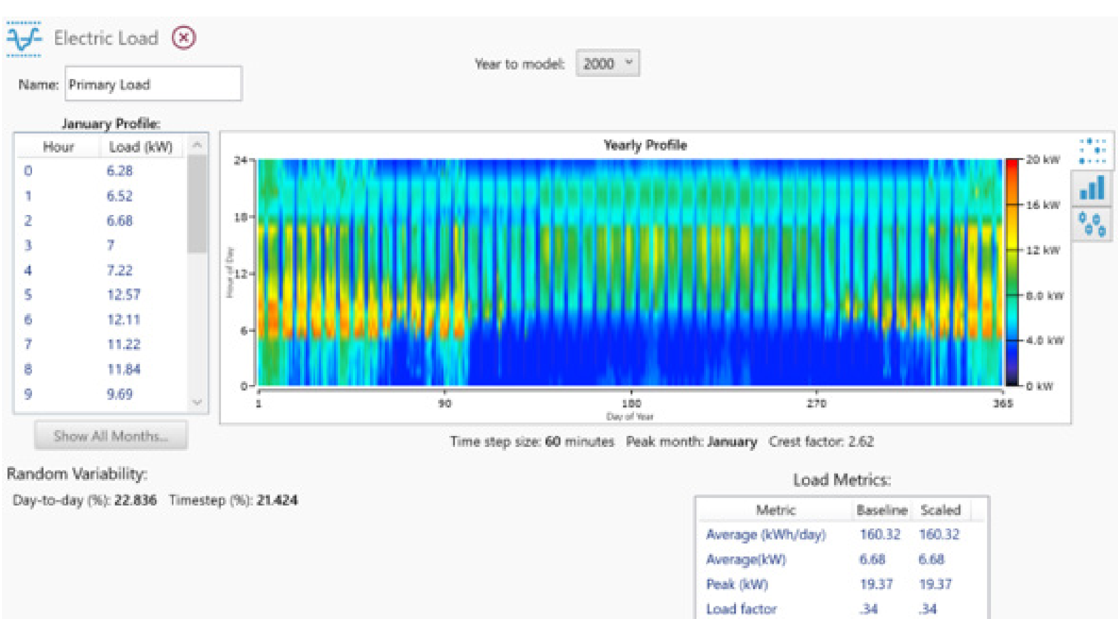
BATTERY STORAGE SYSTEM

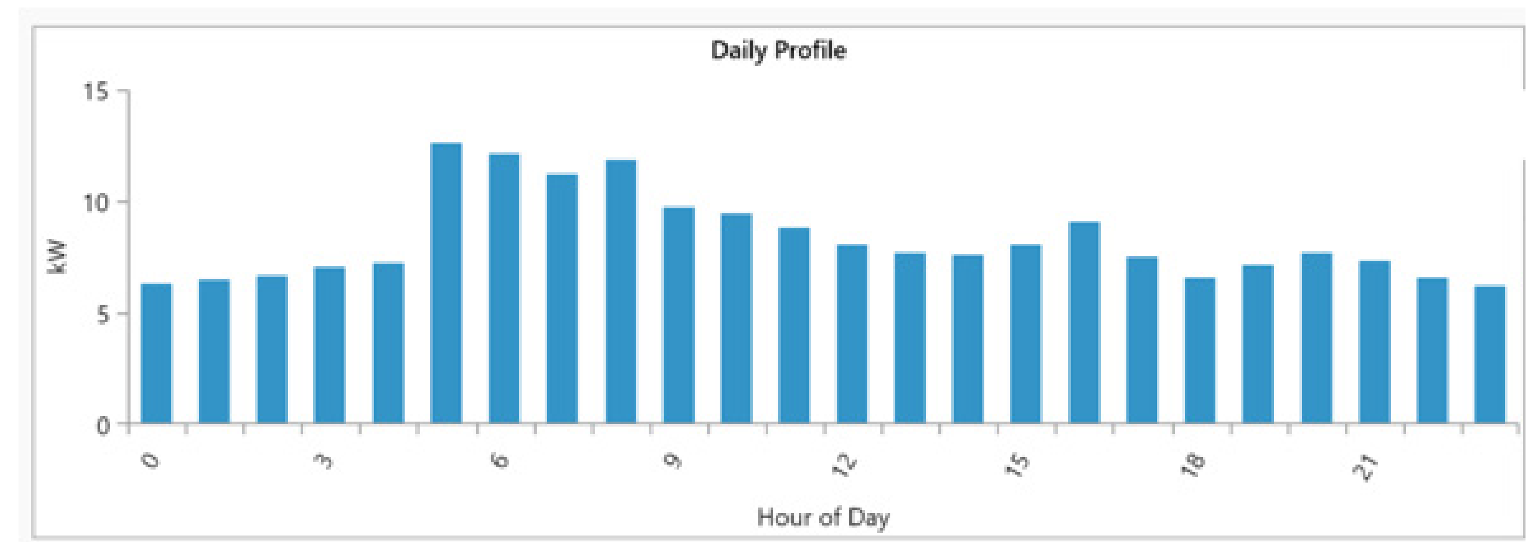
Sizing Storage System:

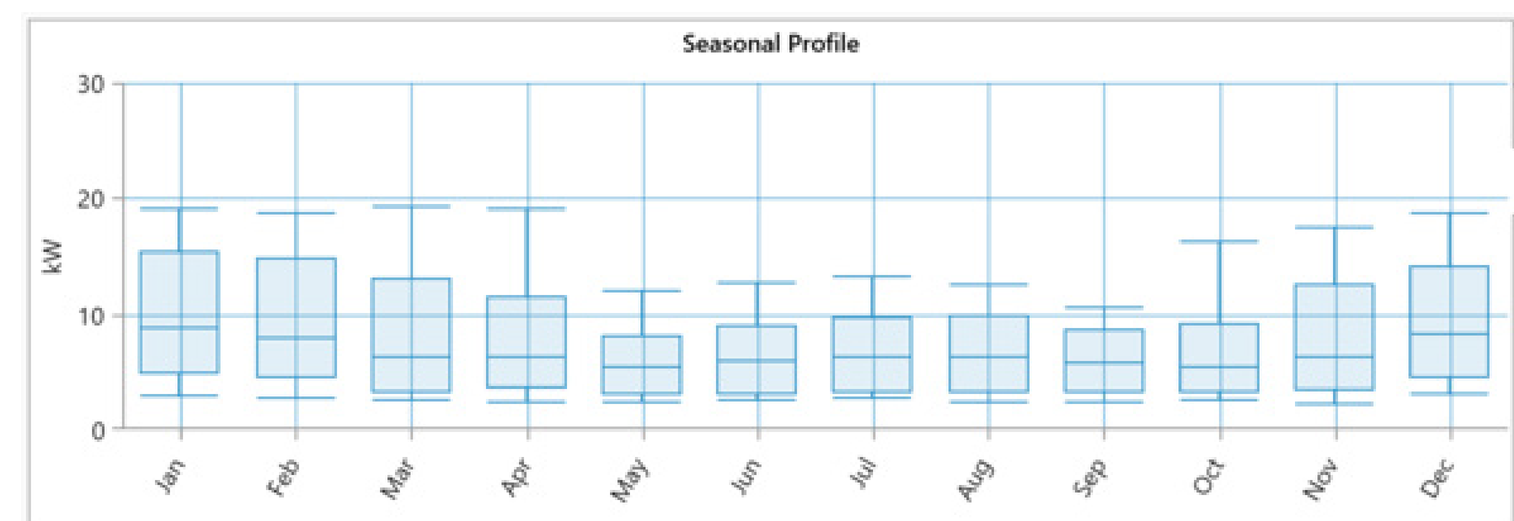
Homer Grid software is used to optimize energy storage system based on demand reduction and economic analysis. PV system capacity of 36 KW as determined by PV Watts was used as a constant for this analysis. Sensitivity analysis was performed for random outage times occurring 1 per year for 2 days.

Outage duration = 48 HRS
For PV Array= 36 KW
Lithium Ion Battery= 94 kWh
Converter = 8.75 kW









CLIMATE ADAPTATION ASSESSMENT MATRIX

IMPACT	ADAPTIVE MEASURE	USING THIS MEASURE? (Y/N)	IF THE PROJECT IS EMPLOYING THIS MEASURE, BRIEFLY DESCRIBE TECHNICAL SPECIFICATIONS
HEAT	Is the project planting trees that will provide shade to buildings, homes, sidewalks, streets, or parking lots?	Y	Trees are planted on the south side of the building, outdoor program areas and walkways to provide shade. Parking stalls are divided into groups with tree medians in between.
	Is the project enhancing insulation of homes?	Y	We propose the use of polyiso rigid insulation on the roof, a more sustainable option to polystyrene. Wool insulation is proposed for walls.
	Is the project installing cool roofs?	Y	Our metal roofing will be coated with a cool roof giving it an SRI value above 65.
	Is the project reducing electrical grid demand and household costs associated with cooling?	Y	The project is using passive systems where possible, and ceiling fans in non conditioned occupiable spaces.
	Is the project providing a community cooling center?	Y	All indoor areas are provided with condition air and many are dedicated to community congregation. In addition we employ large protected outdoor areas adjacent to landscaping and overhead fans.
	Is the project adding permeable land cover?	Y	Building features permeable concrete slabs as the main decking material. Outdoor programs areas are mostly decomposed granite with limited lawn space. A big portion of the site is dedicated for bioretention for ground water recharge.
	Is the project replacing agricultural lands (croplands, rangelands, or pasturelands) or natural land cover (trees, grasslands, shrublands, watersheds, or wetlands) with pavement or buildings? *(Negative co-benefit.)*	Y	Project isolates all built areas on prescribed lots.
	Please add any additional measures employed to address this impact.		Light colored pavers utilize high albedo strategies as well as drought tolerant landscaping to reduce heat island effect.
PRECIPITATION CHANGE *(e.g. drought, extreme precipitation events)*	Is the project setting up an ongoing mechanism to conserve water?	Y	Bioretention system with water awareness measures such as the fog catcher
	Is the project promoting improved soil health, soil quality, or soil stability?	Y	Wind breaks are designed to reduce erosion and wind blown particulates in the air, specific plant types were chosen to stabilize the slopes of the bioretention areas
	Is the project restoring wetlands, watersheds, or riparian buffers?	Y	Our design is centered around preservation of natural plant and wildlife of the Tulare Lake. It encourages natural habitation.
	Is the project planting native, drought-tolerant vegetation?	Y	Trees: Dessert Museum Palo Verde, Palo Blanco, Dessert Willow, Western Redbud Shrub and understory: California bush sunflower, silver bush lupine, toyon All are drought tolerant and most of them are native.
	Is the project changing permeable surfaces to paved surfaces? *(Negative co-benefit.)*	N	All areas outside of interior space are permeable.
	Is the project increasing water use? Negative co-benefit.	Y	We are treating grey water for irrigation. Replenish the ground water through stormwater redirection and retention.
	Please add any additional measures employed to address this impact.		
WILDFIRE	Does the project involve fuels management work to maintain ecosystem health in a high priority landscape?	Y	Trees and shrubs are strategically planted away from Defensible Space Zone 0 (0-5 feet from buildinga). Bioretention areas are designed with gravel and careful placement of shrubs and trees to maintain enough vertical clearance to avoid fuel ladders.
	Does the project involve rehabilitation work in a high priority landscape impacted by wildfire?	Y	Bioretention areas are designed to rehabilitate the landscape
	Does the project involve fire hazard prevention work to mitigate wildfire threats to communities?	Y	Mature trees are strategically located away from buildings and shrubbery clearing practices to be maintained.
	Is the project implementing other types of forest or other ecosystem management treatments to reduce wildfire intensity or reduce potential impacts of wildfires?	Y	The gravel base bioretention ponds will help with fuel management and reduce the intensity of wildfire.
	Is the project implementing other fire mitigation or prevention measures for non-forested habitats that may be impacted by wildfire?	Y	The agriculture crops are separated into groups with buffer zones in between to prevent wildfire from spreading out fast.
	Does the project involve new construction in a high priority landscape for reducing or preventing wildfire threats? *(Negative co-benefit.)*	Y	The Project uses fire resistant wall materials and non combustible roofing materials to reduce wildfire impact.
	Does project include a backup power source (e.g., battery charged by renewable energy, generator) to operate housing development in case of emergency power shutoff?	Y	Battery back up is provided, see page on Battery Storage System for more details.
	Please add any additional measures employed to address this impact.		

EQUITY ESSAY

To address equity for this project, we must address the injustices and inequities of this community's complex history and present.

In tackling food scarcity, we envision this project to provide a space where local farmers are able to allocate and distribute part of their produce yield back to the community. Our proposal of a farmer's market and cafe helps to keep some of the food being produced on these neighboring farms at the local level and service the immediate communities who currently don't have access to fresh healthy food.

In addressing water scarcity, we envision this project to not only capture storm water, but also treat water on site to ensure clean water can be readily sourced and accessed.

In tackling flooding, the site design redirects on site storm water, recharges the ground water, and raises the buildings on a plinth to keep built environments dry and safe. These spaces can be used to shelter the displaced community when their homes have been flooded and provide options to people who don't have the means to relocate to safer conditions quickly.

To address the lack of access to safe green space and play areas, we envision the site to be filled with shaded public courtyards with playgrounds and places to gather for the community. When extreme heat can lead to power outages and leave vulnerable populations without places to cool down, we envision this project to be a safe haven and provide a cooling center for the community.

In facing economic instability, we propose programs that create diverse jobs opportunities and promotes the entrepreneurial spirit Colonel Allensworth founded this town on. The project could rent out venue space, provide art exhibition space, host farmer's markets, and provide jobs in tourism, service, and hospitality industries. The teaching labs can host visiting educators and researchers and provide internet accessibility to a community that often lacks access to connectivity.

We designed for inclusivity in the housing. We provided various types of units to accommodate different demographics such as those with varying mobility abilities and those with families. The shared kitchen and dining allow for large gatherings to share food and culture.

ITERATIVE PROCESS