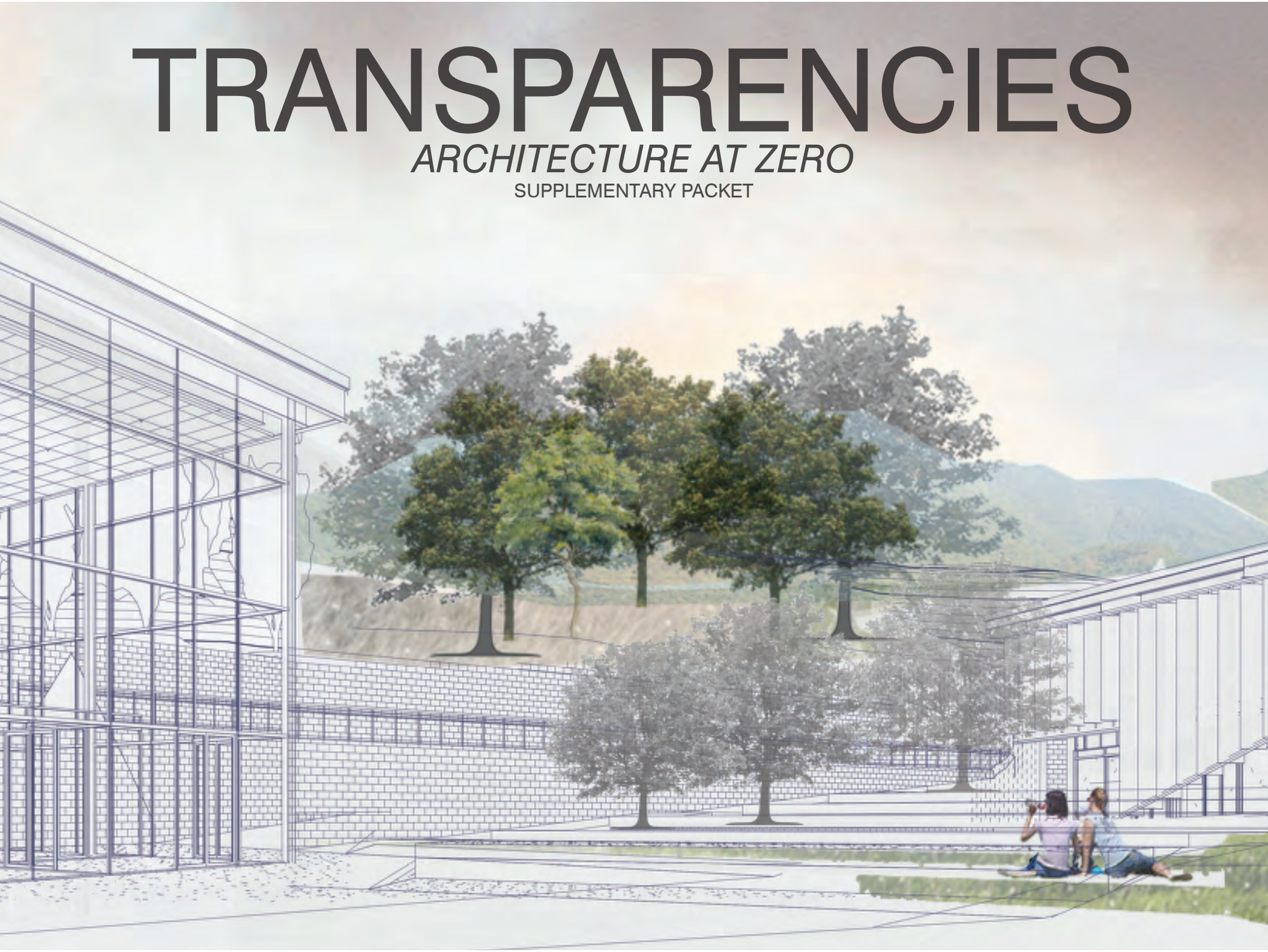
TRANSPARENCIES

ARCHITECTURE AT ZERO

SUPPLEMENTARY PACKET



CONTENTS

PROJECT NARRATIVE

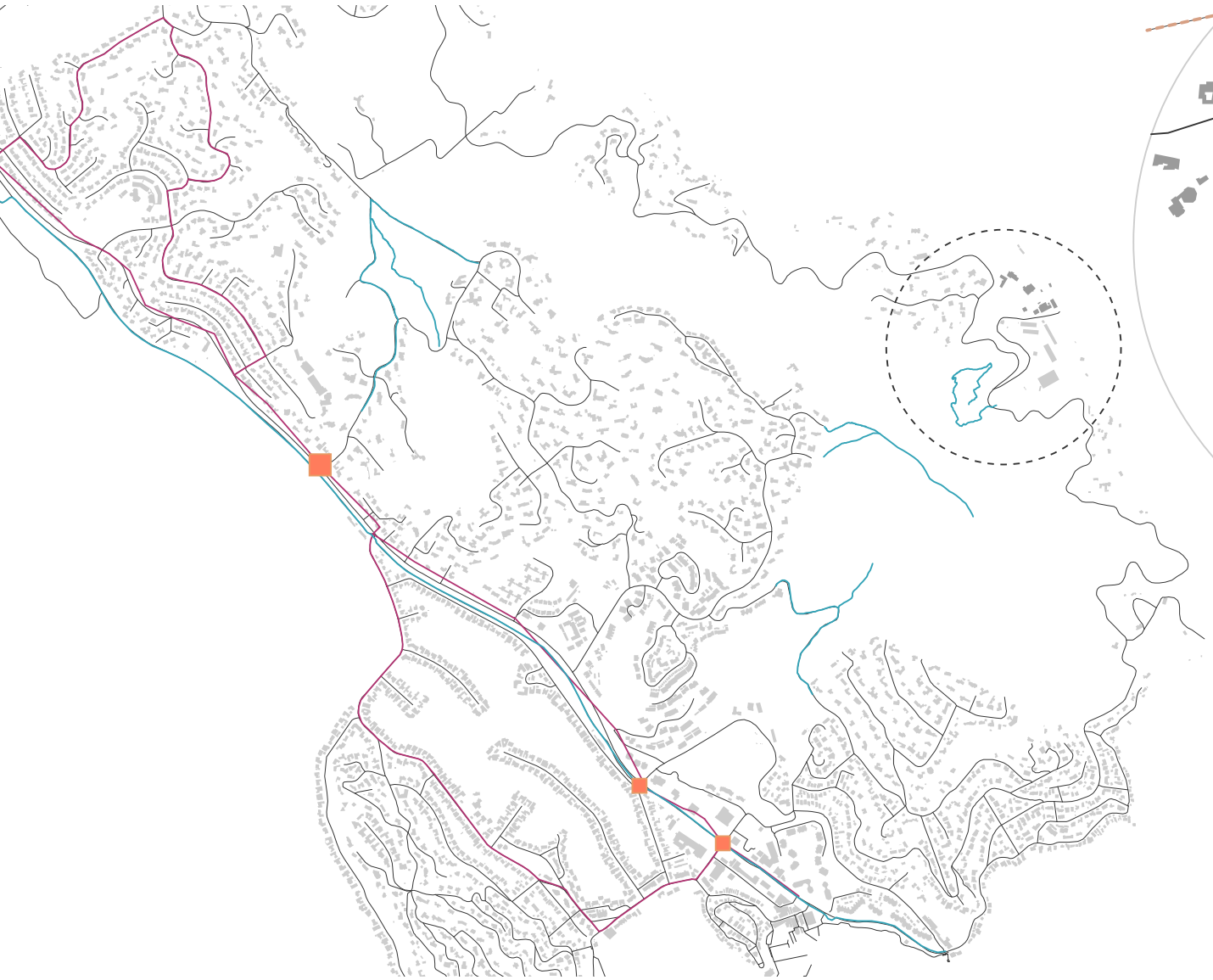
Transparency is a design for the Architecture at Zero competition. The prompt given is to create a net-zero research center that can be used to educate the public on the local aquatic life. The site of the project is the Romberg Tiburon Center Campus in Tiburon, California. The current center is a small handful of buildings scattered around the site. Despite its size, it has a strong pull with the community. It hosts many events which happen to bring locals in by the thousands. This document explores an addition to the preexisting research center plan.

When first analyzing the site, it was decided that the best strategy was to take advantage of the mild weather and continuous sunlight. From this analysis, it was decided to create a form of transparency within the project; a blurred line between the interior and exterior. With the use of curtain wall systems and skylights, a design has been cultivated that takes advantage of not only daylighting, but the magnificent views of the bay, thus allowing the occupants to feel a connection to the exterior world. The neccessity to create connections to the environment was also very important because this unique site is characterized by elevation and terrain changes that are accentuated within the site plan. The building layout celebrates existing and proposed relationships on site.


SITE ANALYSIS

SITE ANALYSIS

[TIBURON, MARIN COUNTY, CALIFORNIA]

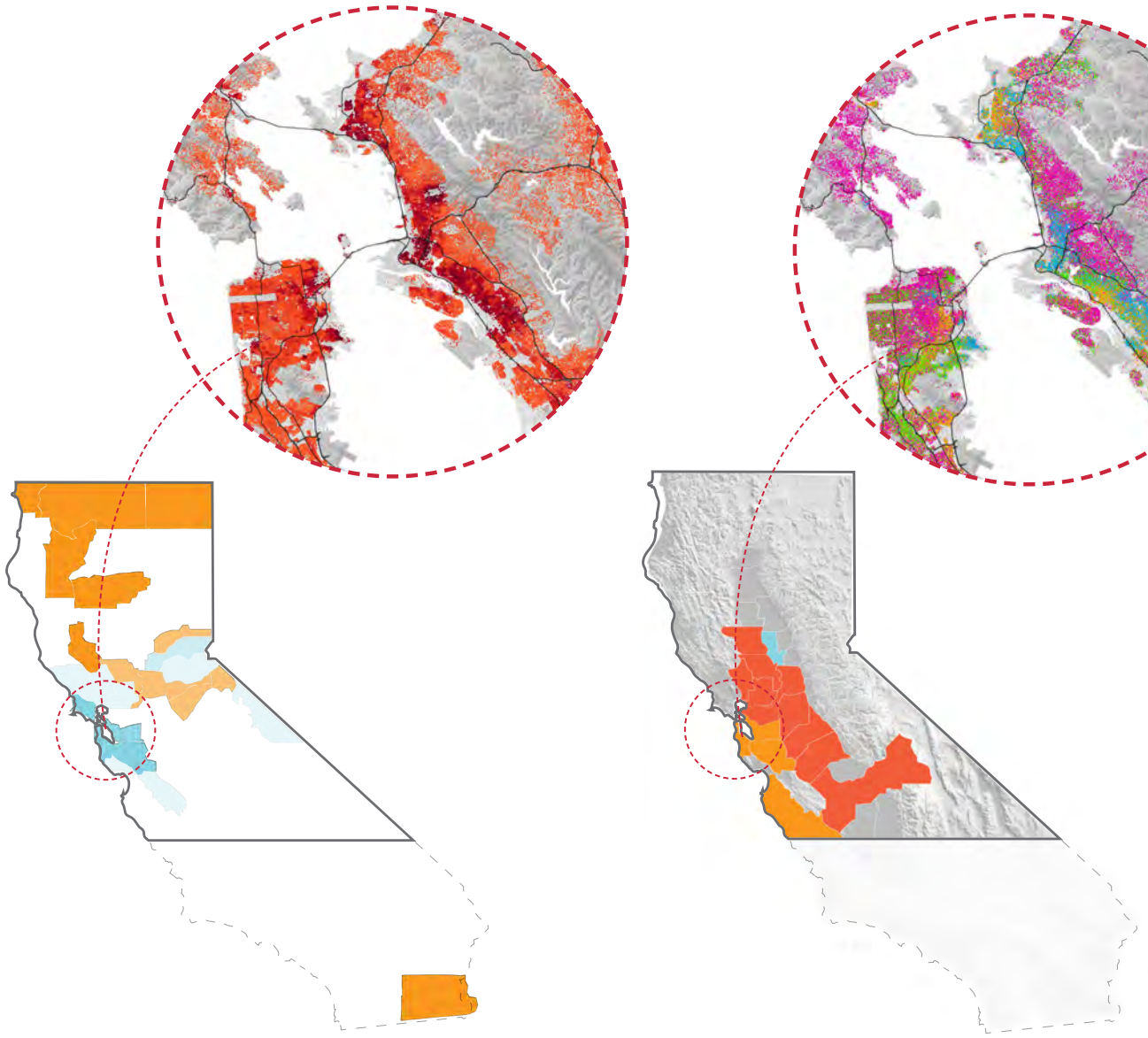


[RTC ROMBERG TIBURON CENTER]

SITE ANALYSIS

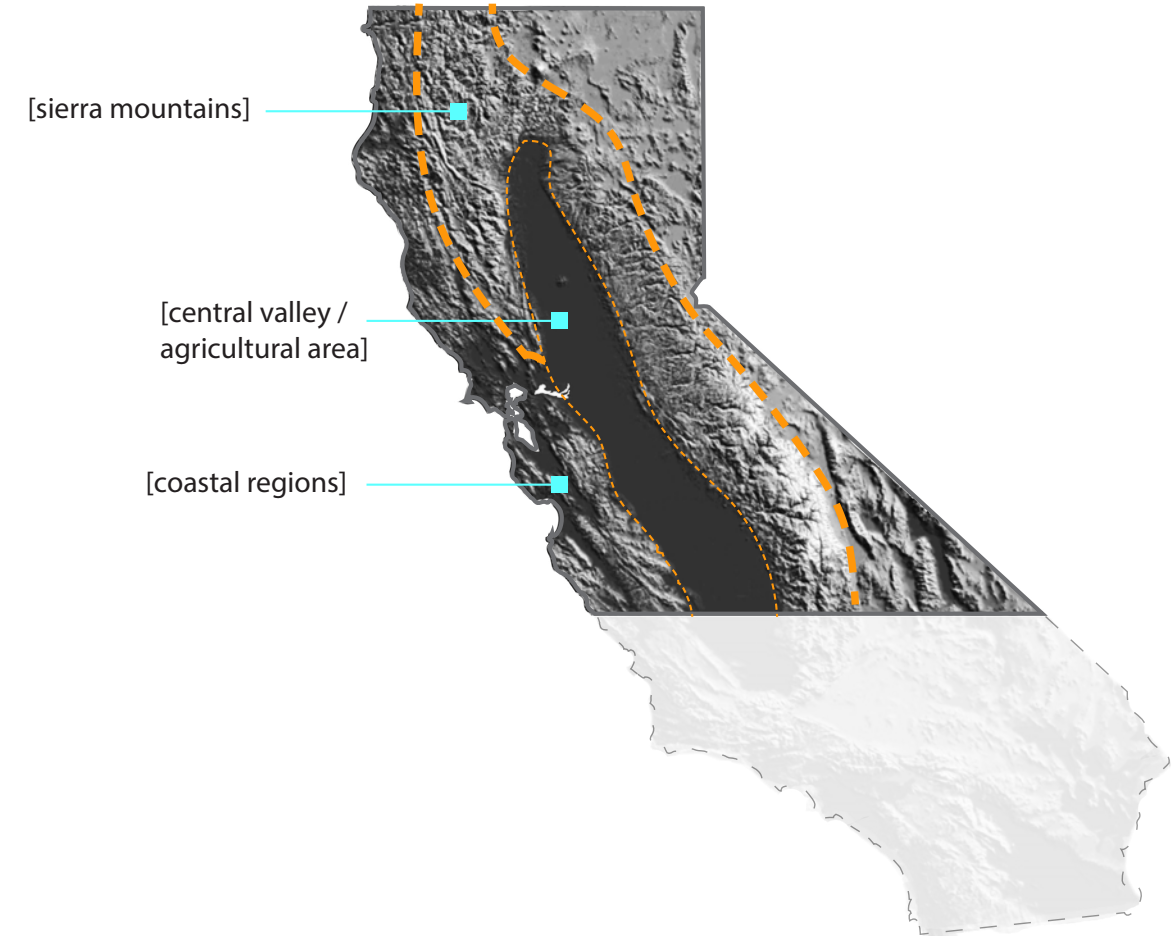
[DIVERSITY]

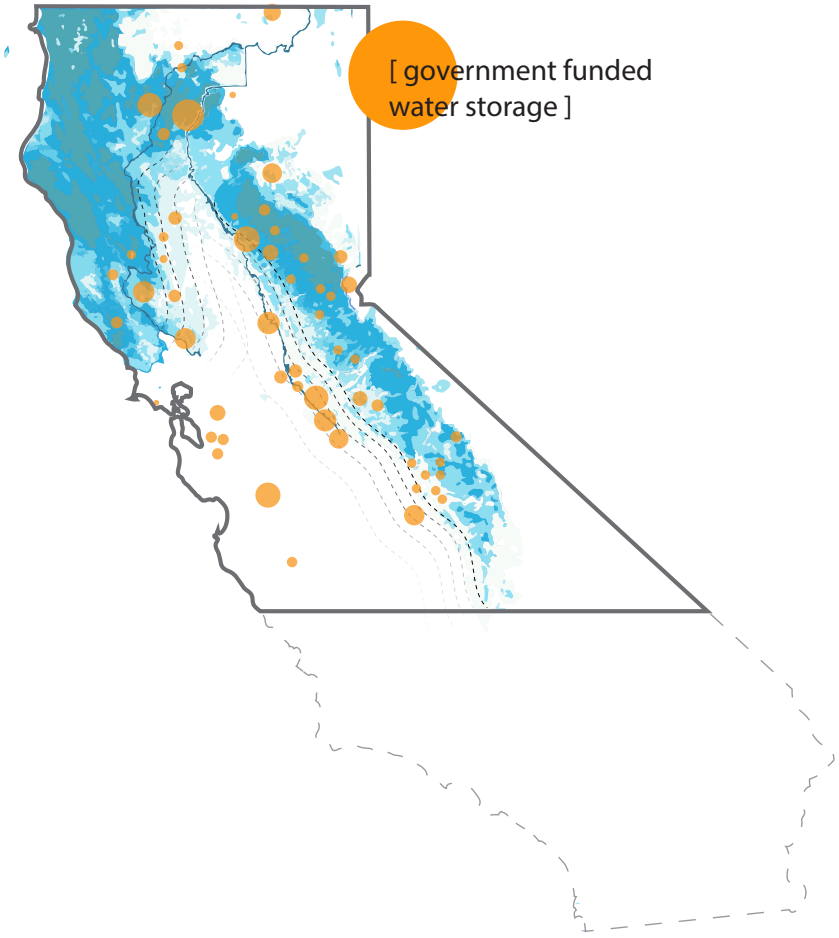
California is a place of great diversity. The scale, coastal location, and rich history of the state all play a role in the incredible immigrant population, accounting for over 25% of the population in many California counties. The lifestyle of Californians varies greatly as well from cultural pockets and neighborhoods to huge swings among income levels that can be found between urban and rural areas. The edges between these areas, wealthy and impoverished, native and immigrant, urban and rural can be exremely thin, or very defined, but are woven together in a seemingly coherent way. Beyond historic tensions between interstest groups, ethnicities, and current social injustices similar to many modern urban areas, California's personality defines its eclectic character.



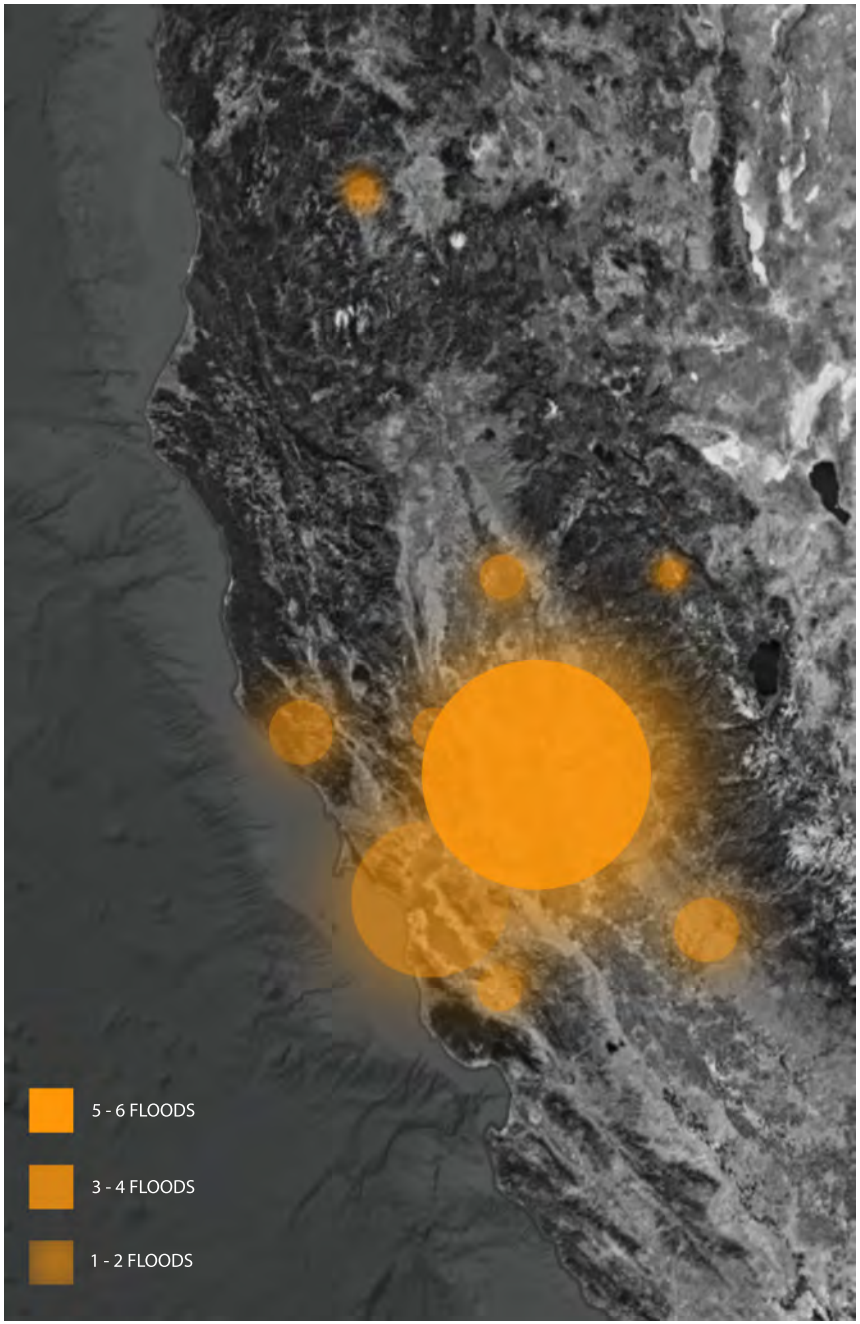
SITE ANALYSIS

[GEOGRAPHY AND RESOURCES]





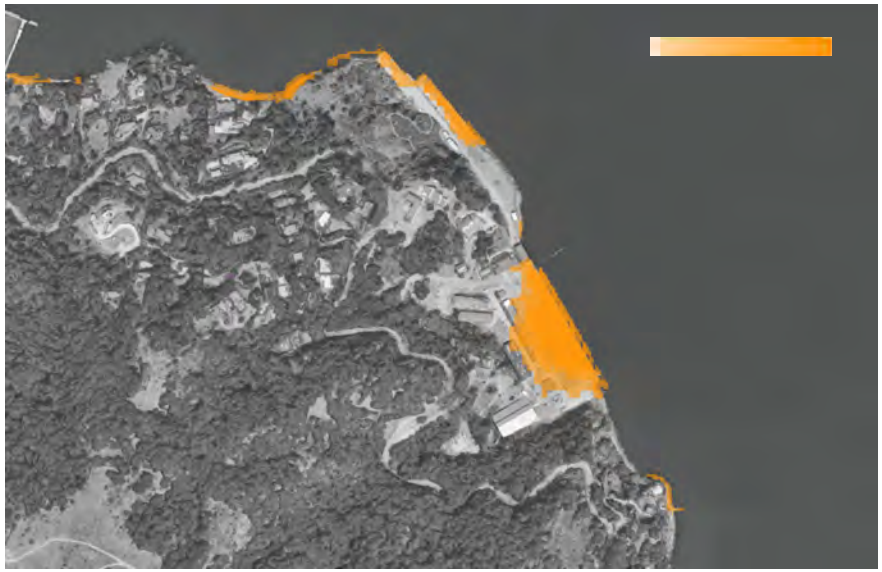
SITE ANALYSIS



FLOODING OF NORTH CALIFORNIA

[FLOODING]

Flooding has been a destructive force in the state of California for hundreds of years, most occurring on the western side of the state. A particularly active region in the state is Sacramento caused by the reoccurring overflow of the Sacramento river. The largest flood in California's recorded history was the Great Flood of 1861-62. This event not only filled the Sacramento Valley, but the San Joaquin Valley, as well. The water stood 4 feet deep for over three weeks requiring the State government to relocate its capital from Sacramento for the 18 month reconstruction period. Additionally, South Bay and San Francisco experienced major flooding, but none reaching the extent of California's Great Flood. With respect to damage caused, the closest comparative event was the North Coast Tsunami of 1964. Following an earthquake in Alaska, the tsunami hit North California's coast resulting in 14 deaths and a loss of $14 million to the county of Del Norte alone.



FLOODING OF ROMBERG TIBURON CENTER

DESIGN

DESIGN

The site chosen is located at the midpoint of a steep hill in the Romberg Tiburon Center Campus. In consideration of the slope and topography, it was elected to carve into the hillside. The natural landscape and existing building pads determined the base heights of the buildings. Large retaining walls hold back the earth creating a terracing outdoor space. This terracing system acts not only as an outdoor gathering space, but a bridge connecting the buildings, as well.

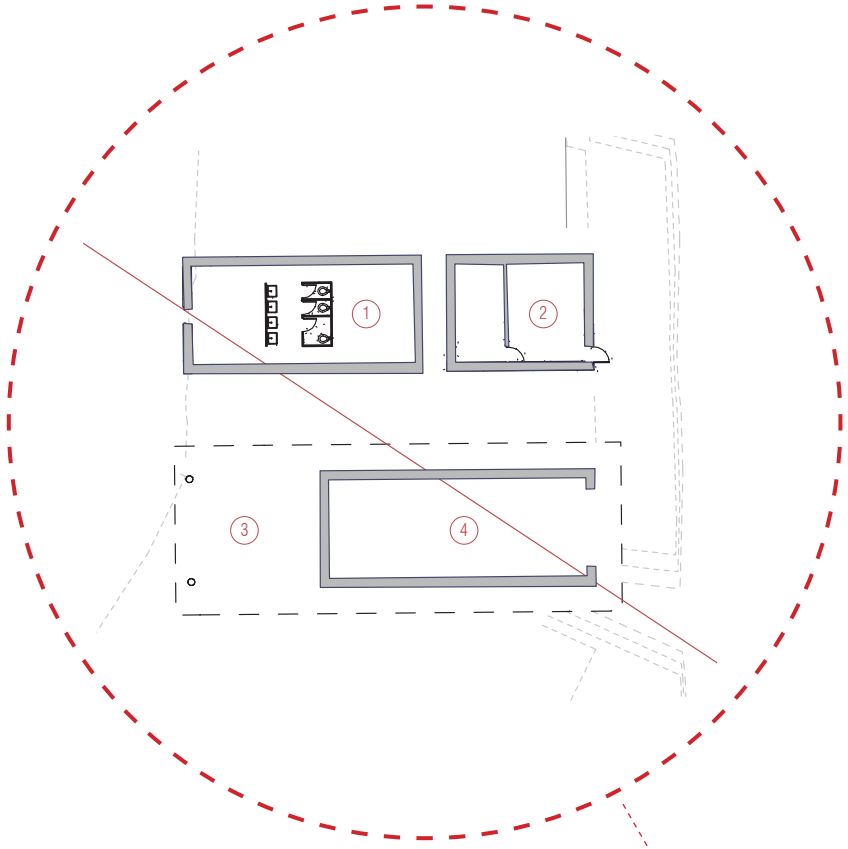
SITE PLAN

1. IMMERSIVE LEARNING CENTER - WET LAB
2. MARINE EXHIBITION - ADMISTRATIVE
3. PUBLIC OUTDOOR TERRACES
4. EXPERIENCE BY THE BAY - KAYAK HOUSES

DESIGN

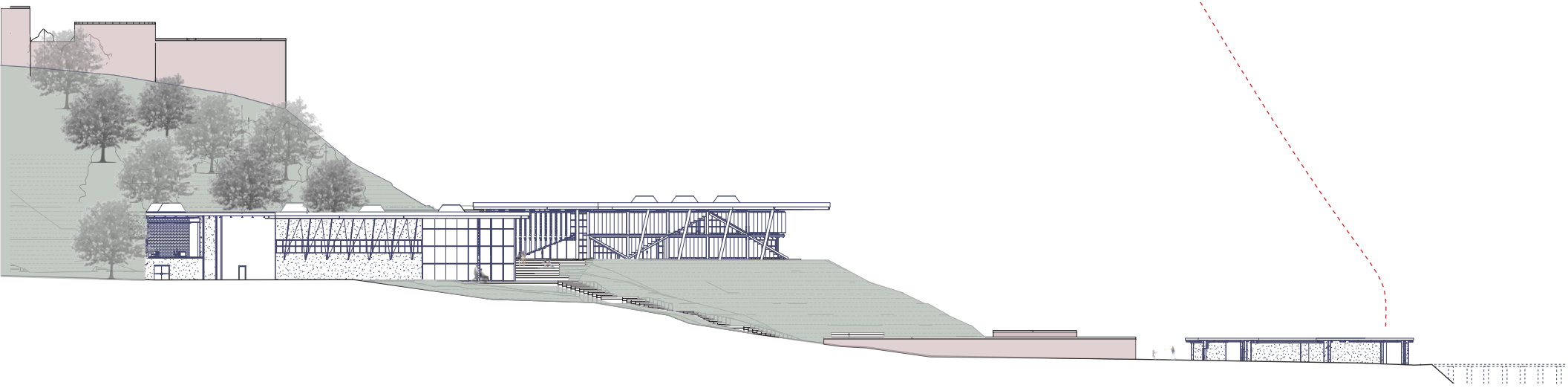
The unique views and topography influenced the decision surrounding the site selection for the buildings. Glass curtain walls were purposefully implemented into the design to maximize the view of the bay connecting the outdoors to the indoor space. Due to site restrictions and limited availability for windows, skylights and outdoor access were strategically integrated to maximize natural daylighting and circulation.

Along the shore of the bay, the kayak buildings sit on grade to the existing slab for convenient access to the dock. Their design not only incorporates a storage facility for equipment, but also offers a covered multi-purpose space for public use. The design permits for future development of recreational and educational programming expanding community involvement with the Romberg Tiberon Center.

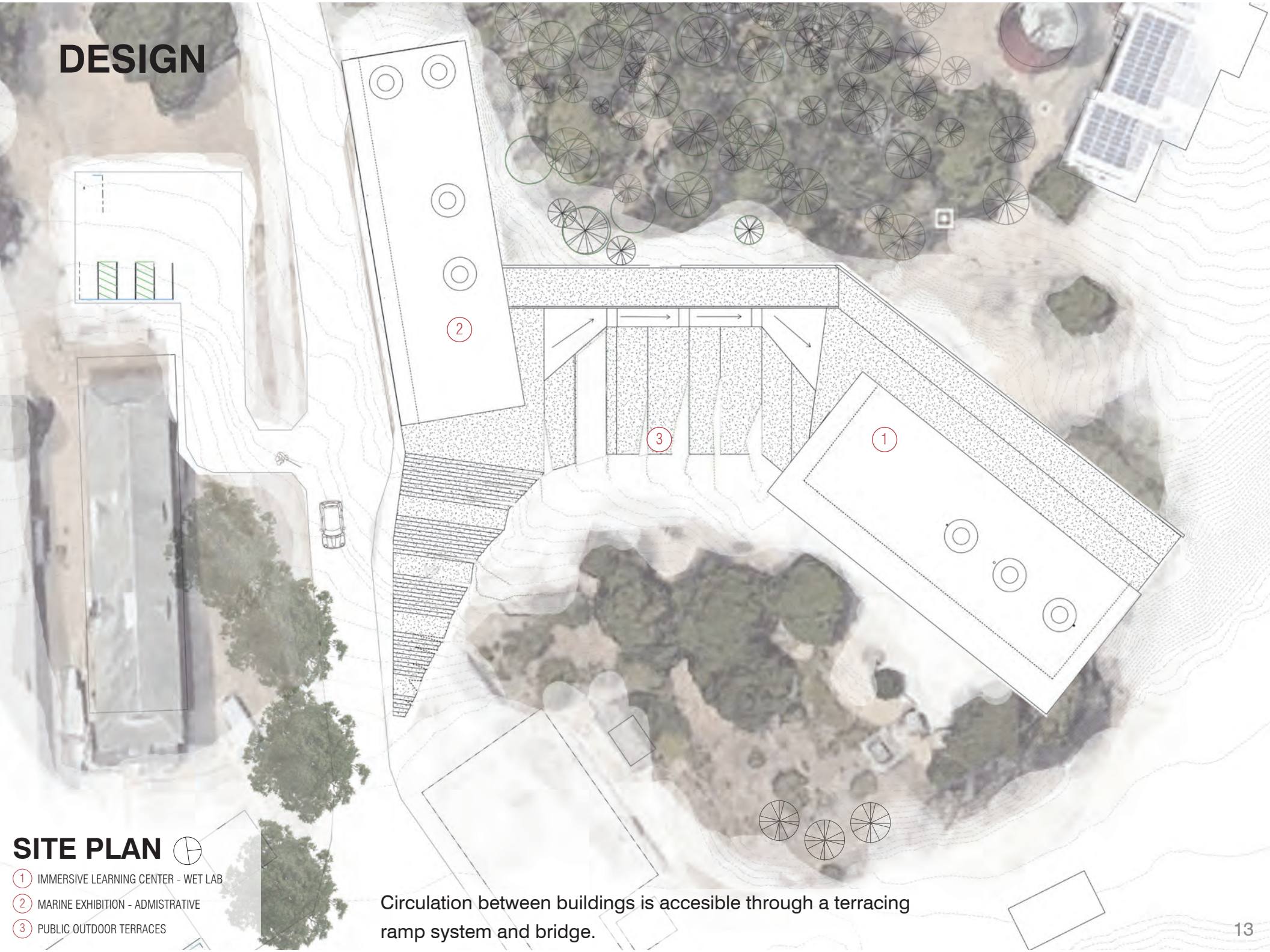


KAYAK

1. OFFICE / RENTAL
2. LOCKERS / RESTROOM
3. COVERED OUTDOOR SPACE
4. KAYAK STORAGE



DESIGN



SITE PLAN

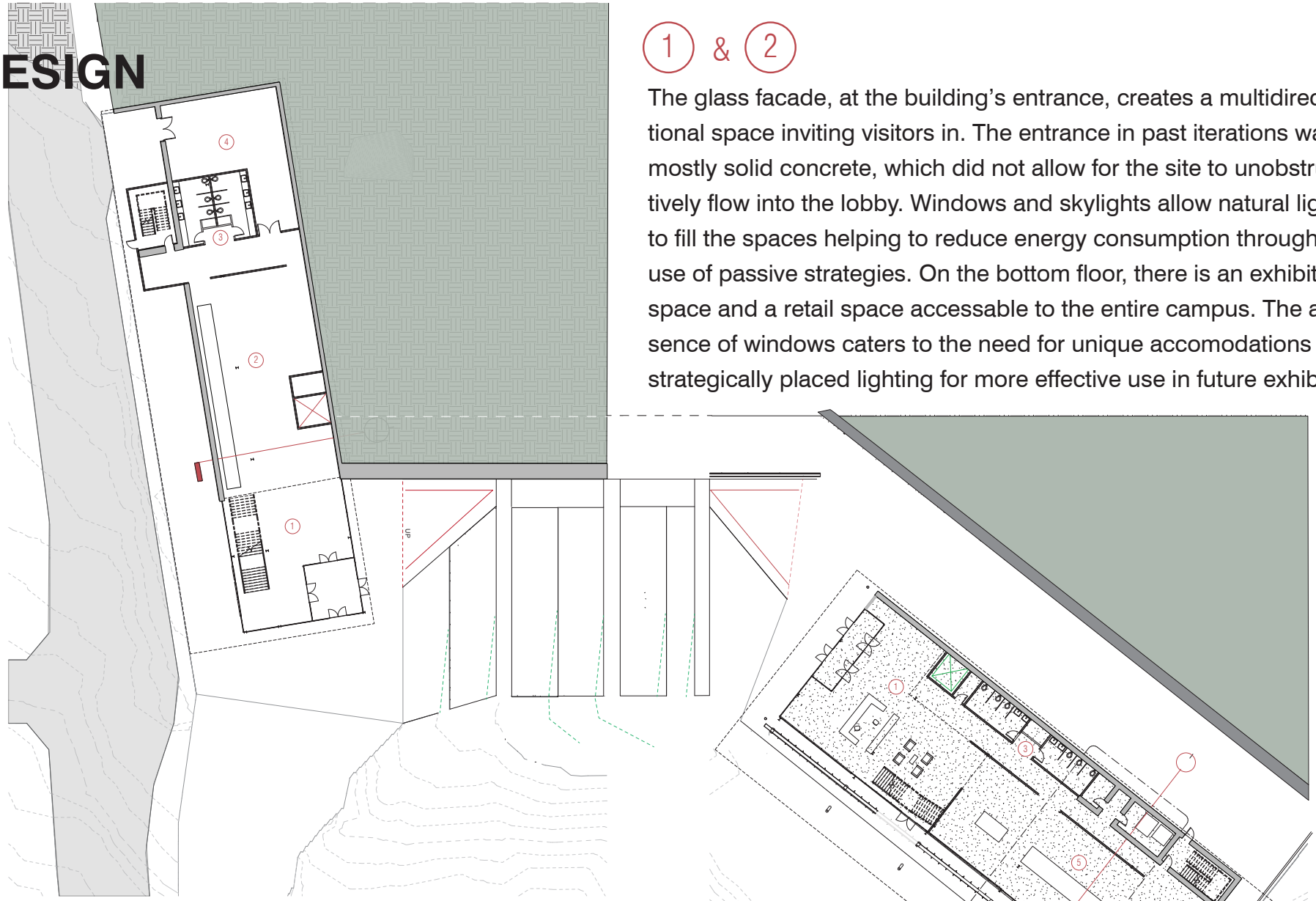
1. IMMERSIVE LEARNING CENTER - WET LAB
2. MARINE EXHIBITION - ADMISTRATIVE
3. PUBLIC OUTDOOR TERRACES

Circulation between buildings is accesible through a terracing ramp system and bridge.

DESIGN

1 & 2

The glass facade, at the building's entrance, creates a multidirectional space inviting visitors in. The entrance in past iterations was mostly solid concrete, which did not allow for the site to unobstructively flow into the lobby. Windows and skylights allow natural light to fill the spaces helping to reduce energy consumption through the use of passive strategies. On the bottom floor, there is an exhibition space and a retail space accessable to the entire campus. The absence of windows caters to the need for unique accomodations and strategically placed lighting for more effective use in future exhibits.



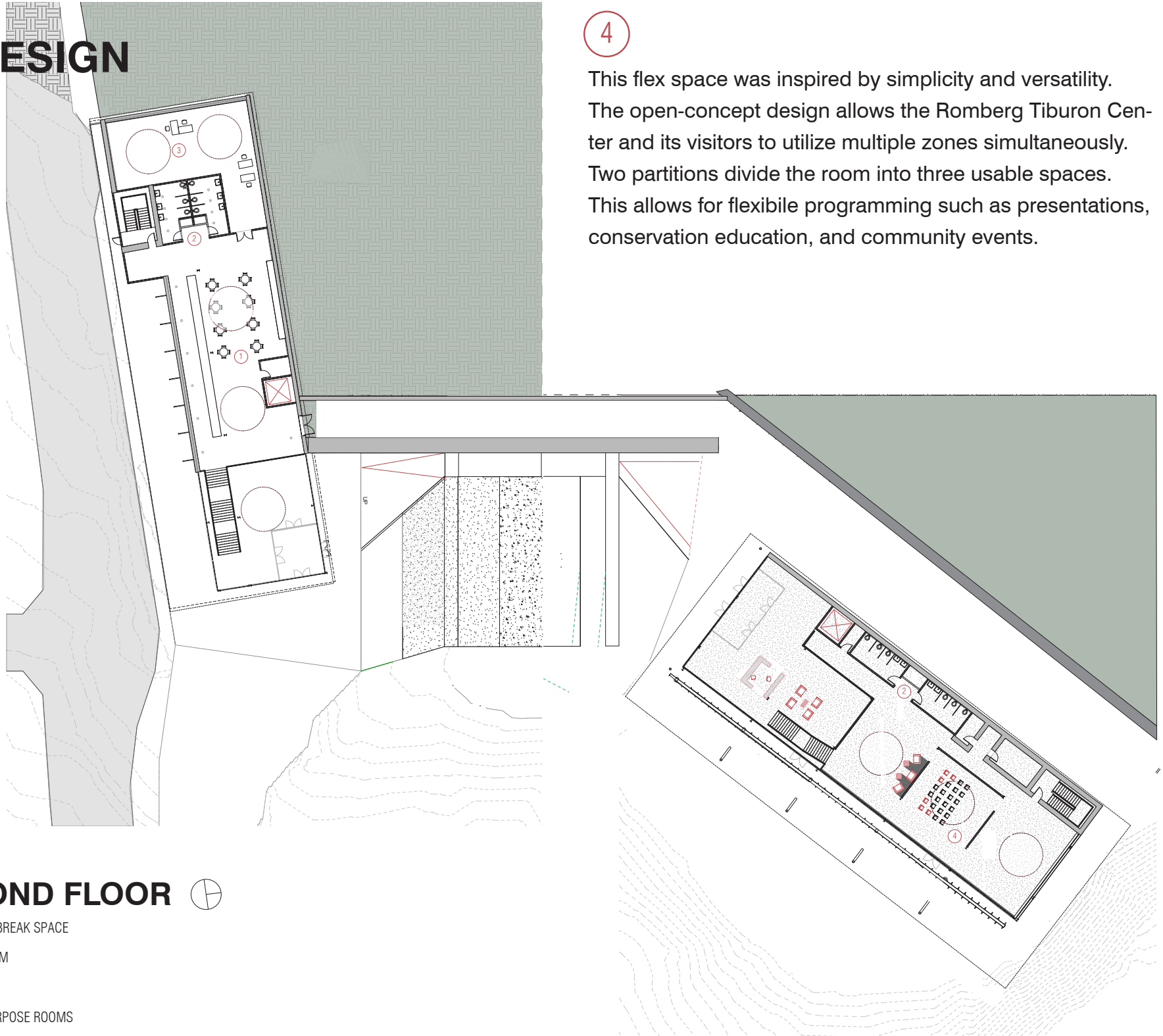
FIRST FLOOR

1. LOBBY / RECEPTION
2. EXHIBITION SPACE
3. RESTROOM
4. STORAGE
5. WET LAB SPACE

DESIGN

4

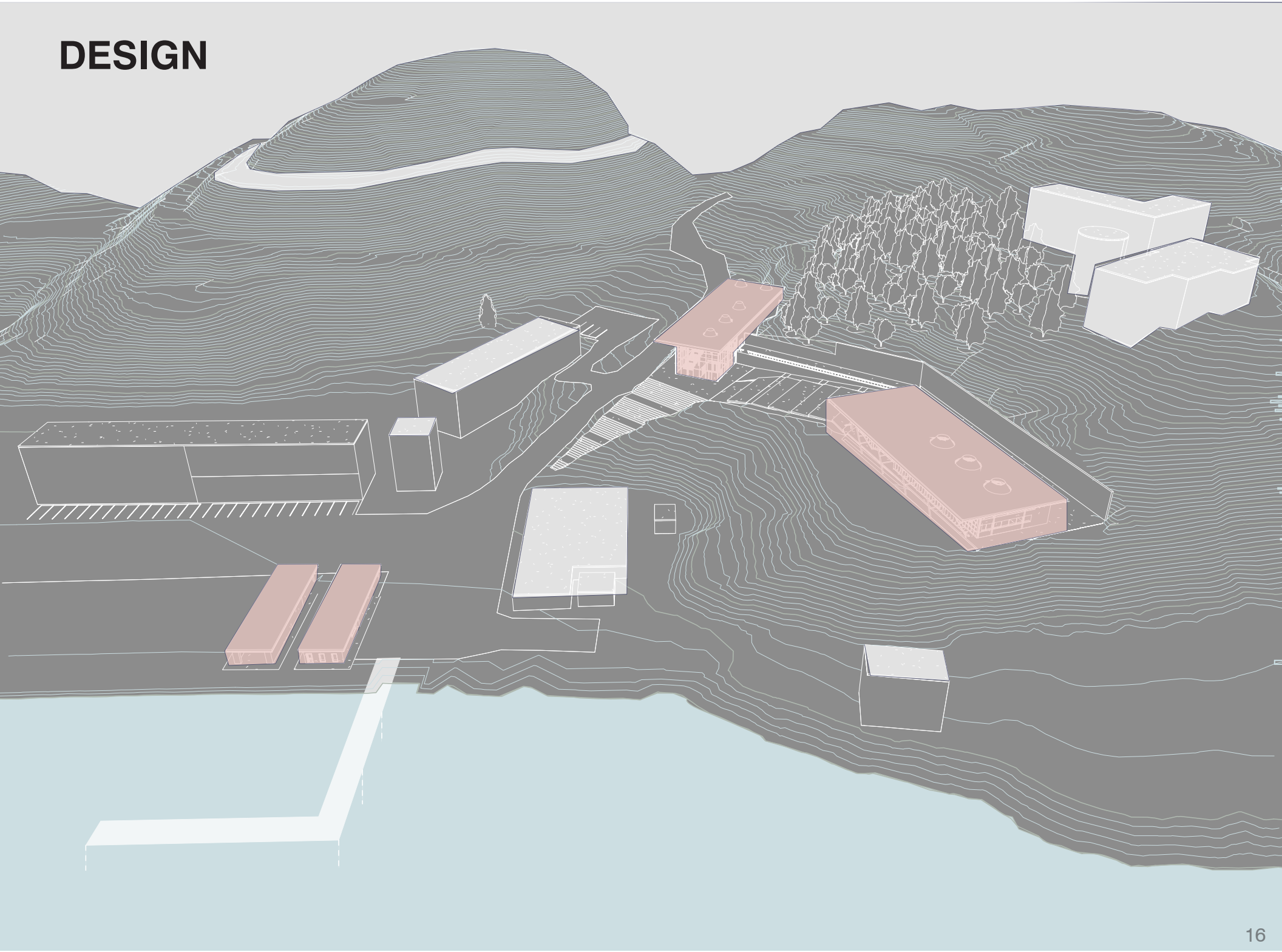
This flex space was inspired by simplicity and versatility. The open-concept design allows the Romberg Tiburon Center and its visitors to utilize multiple zones simultaneously. Two partitions divide the room into three usable spaces. This allows for flexibile programming such as presentations, conservation education, and community events.



SECOND FLOOR

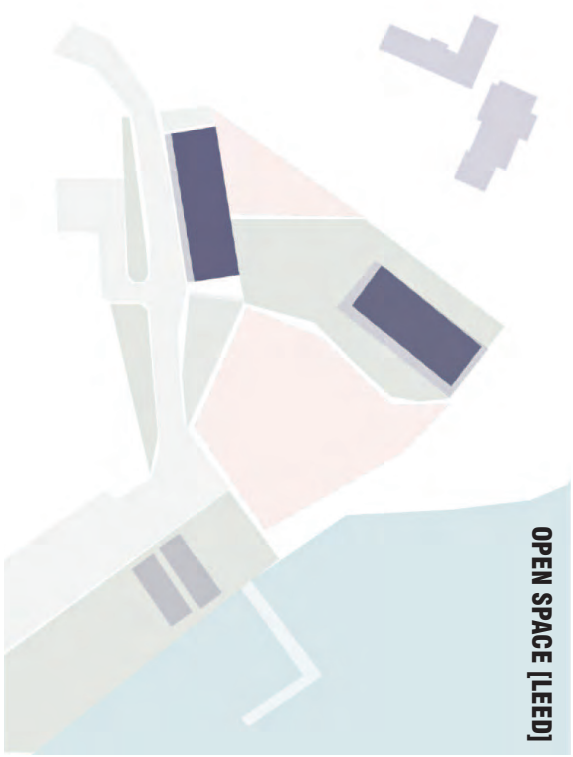
1. LUNCH / BREAK SPACE
2. RESTROOM
3. OFFICES
4. MULTIPURPOSE ROOMS

DESIGN

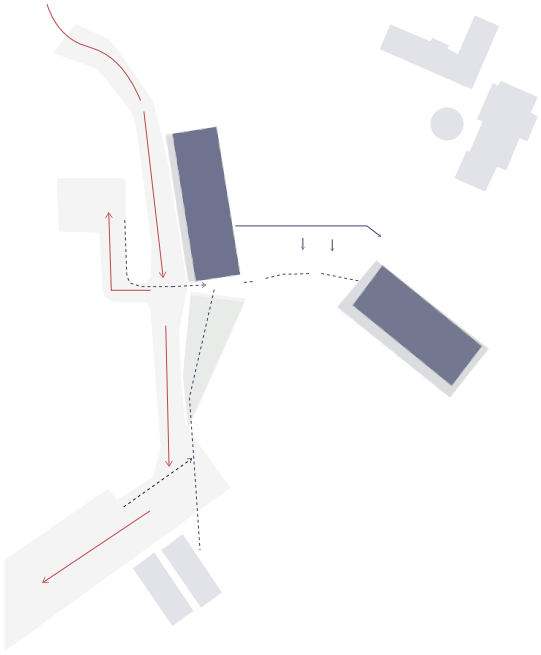


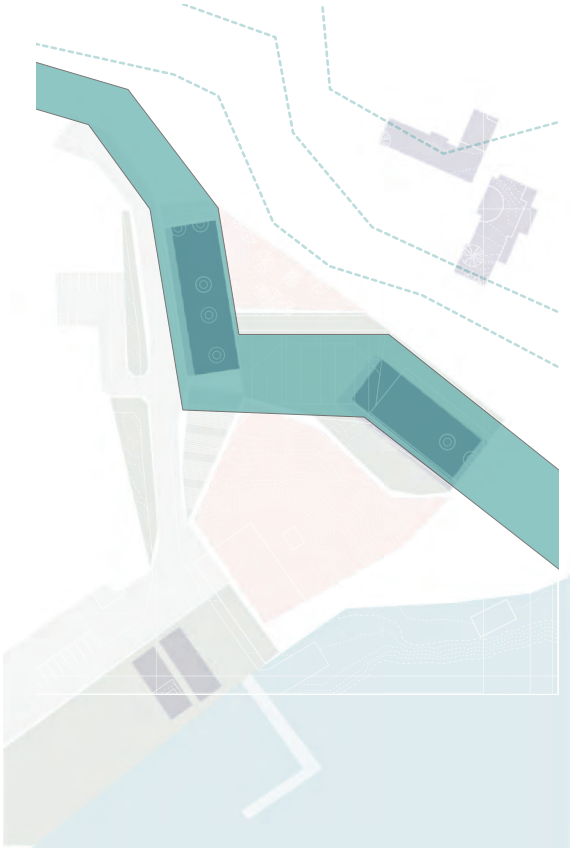
DESIGN ANALYSIS

DESIGN ANALYSIS



SITE CIRCULATION





TOPOGRAPHY INFLUENCE

[re]vegetated + [re]programmed land

[re]vegetated + [re]programmed land

programmed buildings

hardscape

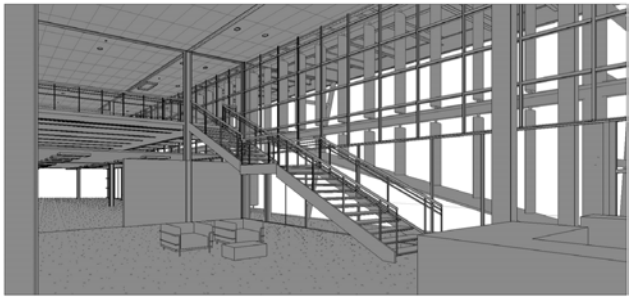
vehicular

pedestrian

DESIGN ANALYSIS

DAYLIGHTING [SUMMER SOLSTICE]

The series of images shows the solar impact within the immersive learning center during the summer solstice. The vertical louvers and cantilevered roof-top allow for ample coverage keeping the interior temperature lower during the warm-er months.



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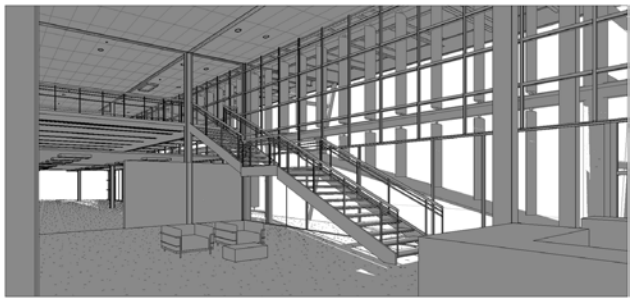

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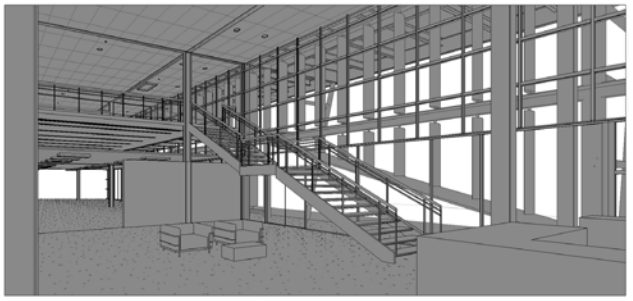

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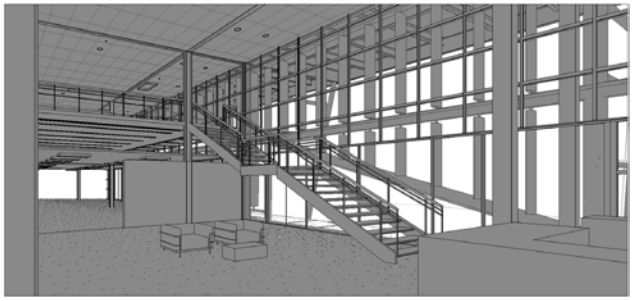

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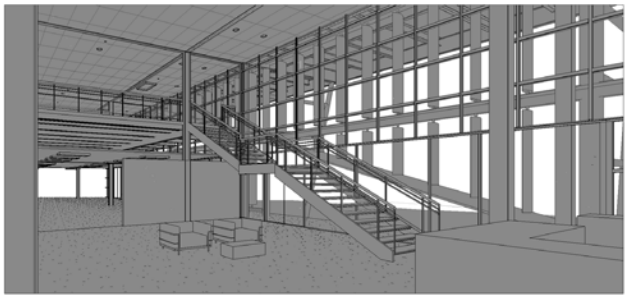

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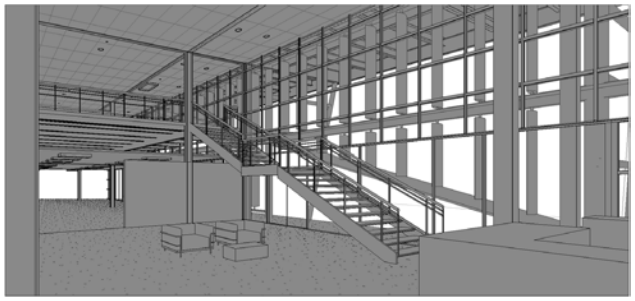
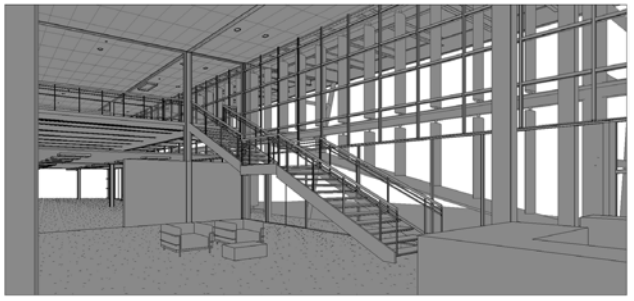


10:30 AM

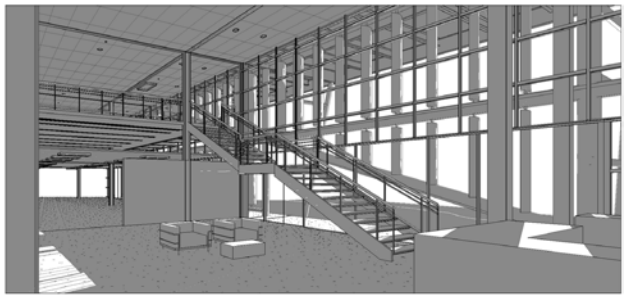


6:30 PM

DESIGN ANALYSIS

DAYLIGHTING [WINTER SOLSTICE]

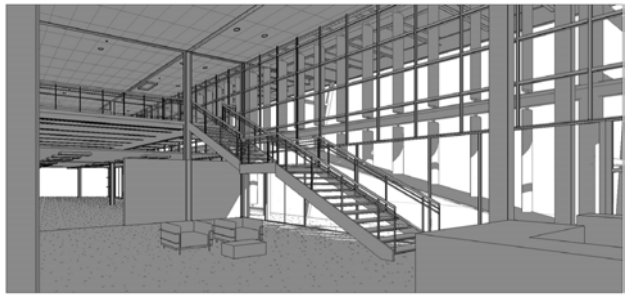
This series of images shows the immersive learning center during the winter solstice. During this time of the year, the lower angle of the sun allows the vertical louver system to permit a greater amount of sunlight into the building. This feature allows more natural light and greater efficiency when heating the interior during these cooler months.



6:30 AM

8:30 AM

10:30 AM



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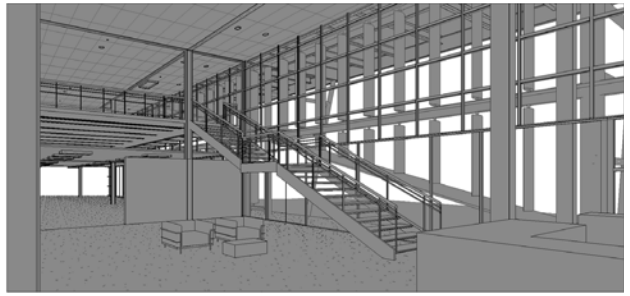

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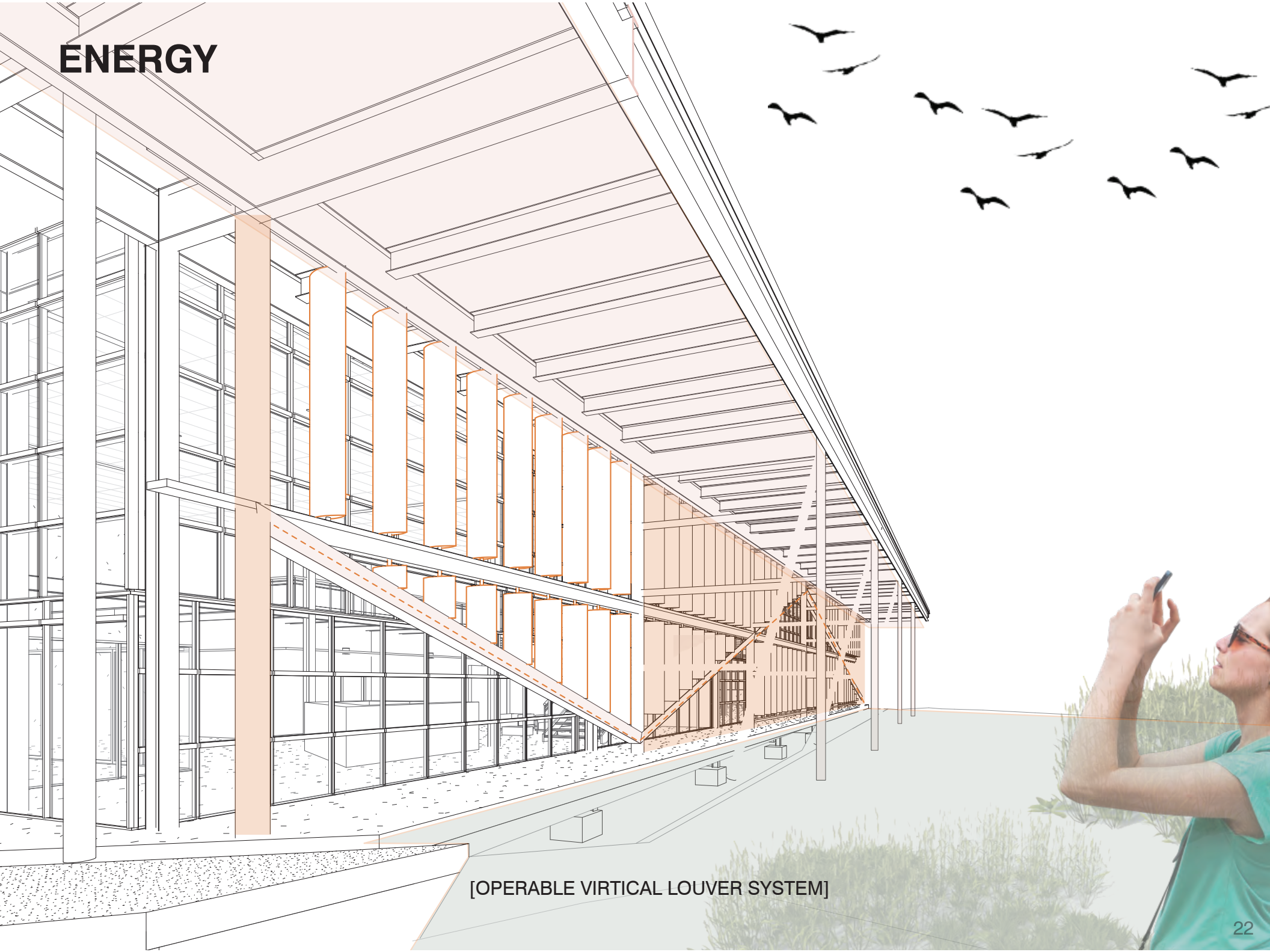
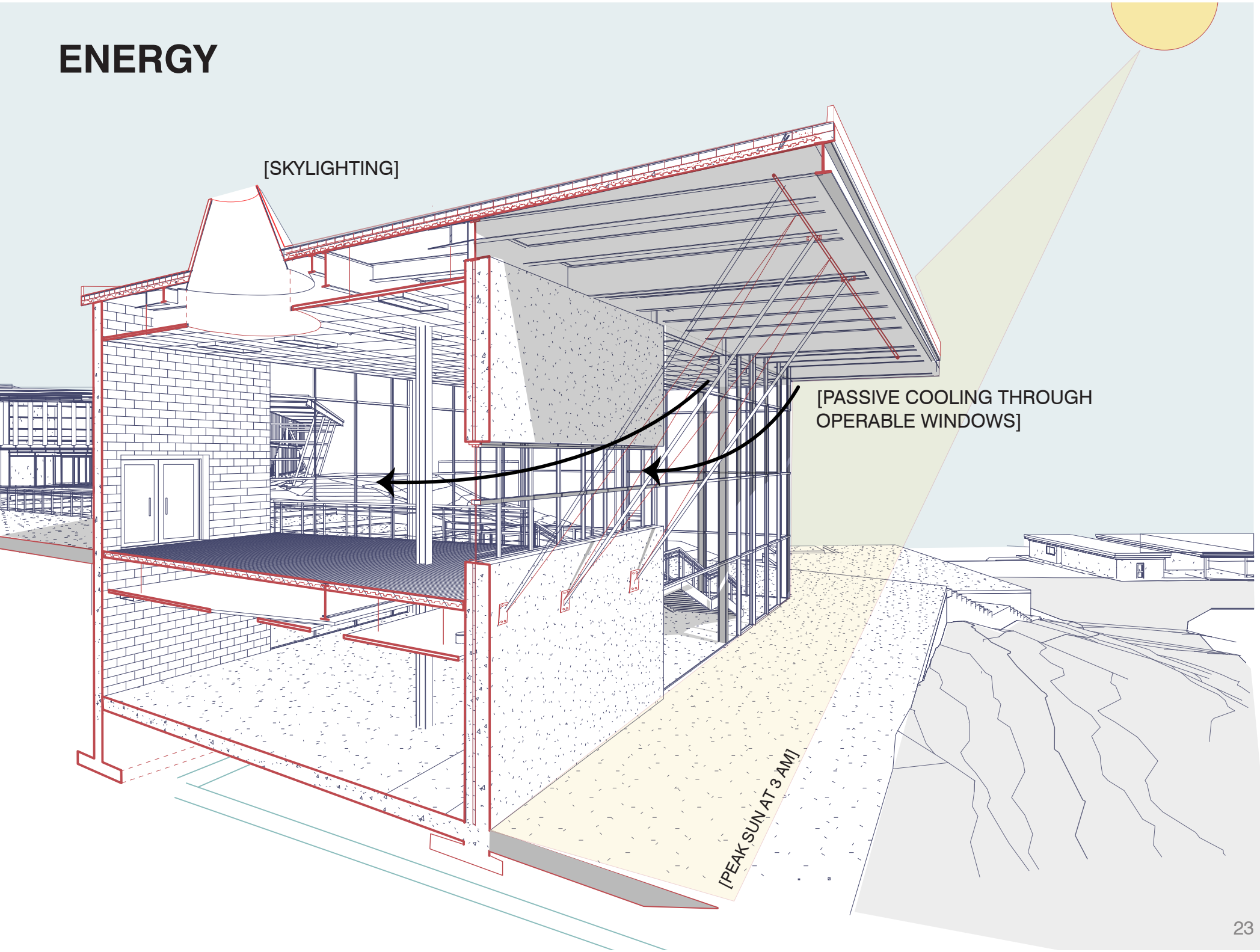
ENERGY

ENERGY



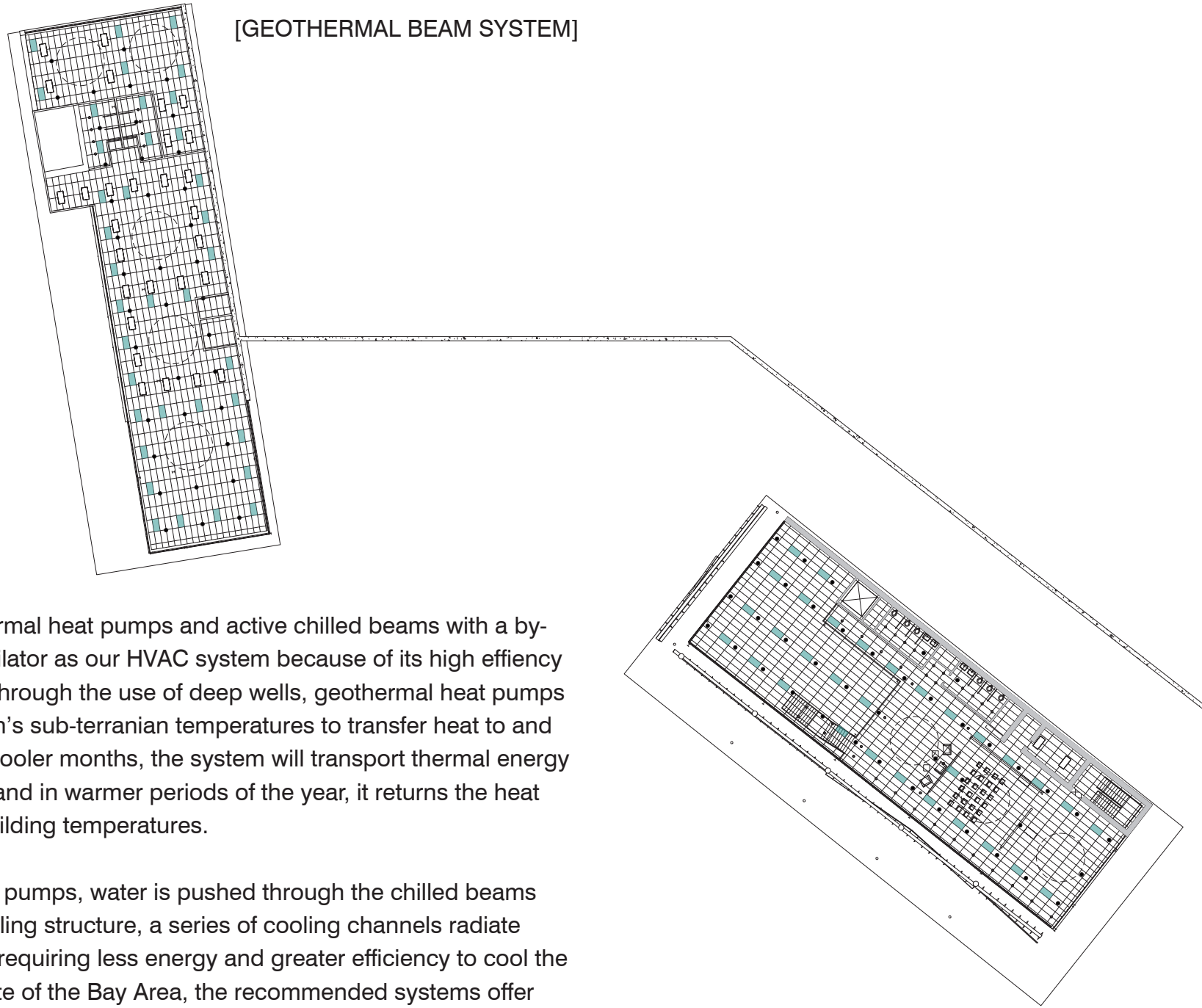
[OPERABLE VIRTICAL LOUVER SYSTEM]

ENERGY


[SKYLIGHTING]
[PASSIVE COOLING THROUGH
OPERABLE WINDOWS]
[PEAK SUN AT 3 AM]

ENERGY

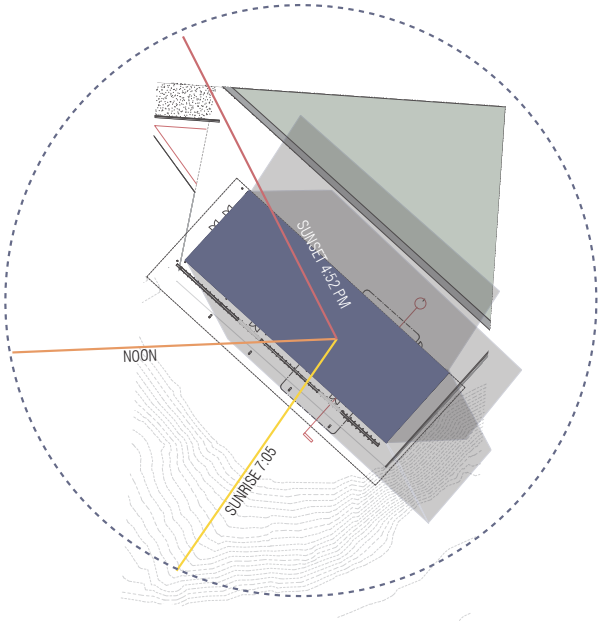
[GEOTHERMAL BEAM SYSTEM]



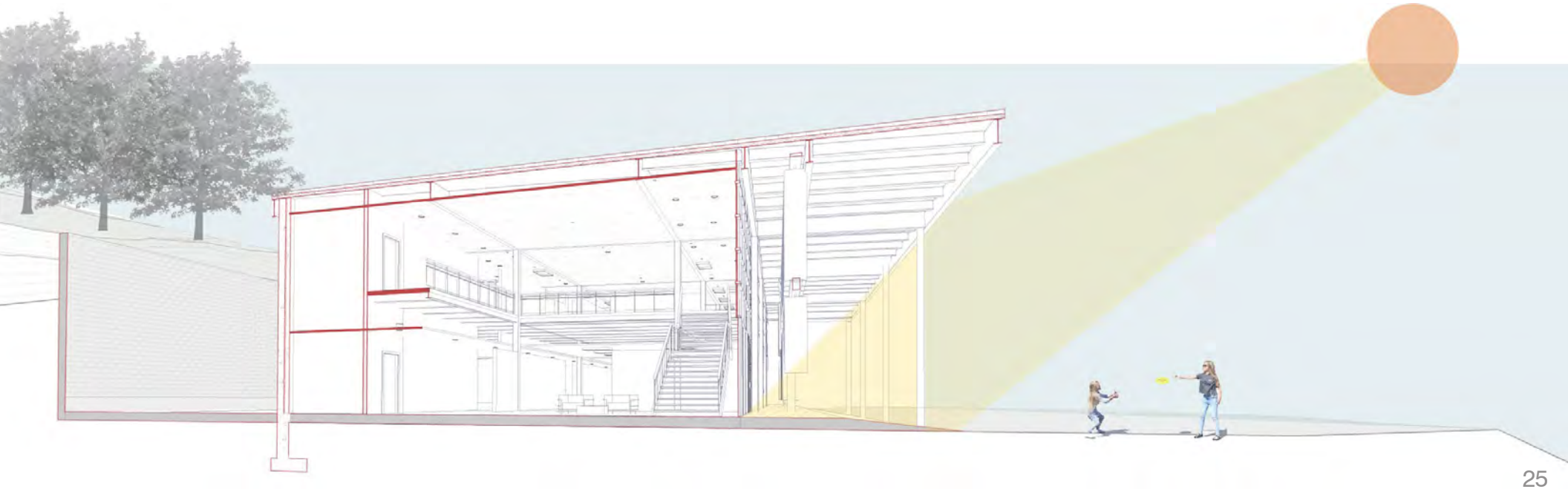
We decided to use geothermal heat pumps and active chilled beams with a by-pass energy recovery ventilator as our HVAC system because of its high effiency and space conservation. Through the use of deep wells, geothermal heat pumps take advantage of the earth's sub-terranian temperatures to transfer heat to and from the building. During cooler months, the system will transport thermal energy for more efficient heating, and in warmer periods of the year, it returns the heat helping maintain cooler building temperatures.

Using the geothermal heat pumps, water is pushed through the chilled beams system. Located in the ceiling structure, a series of cooling channels radiate comfortable temperatures requiring less energy and greater efficiency to cool the space. With the mild climate of the Bay Area, the recommended systems offer an enivronmentally conscious and operationally cost effective alternative to their commercial counterparts.

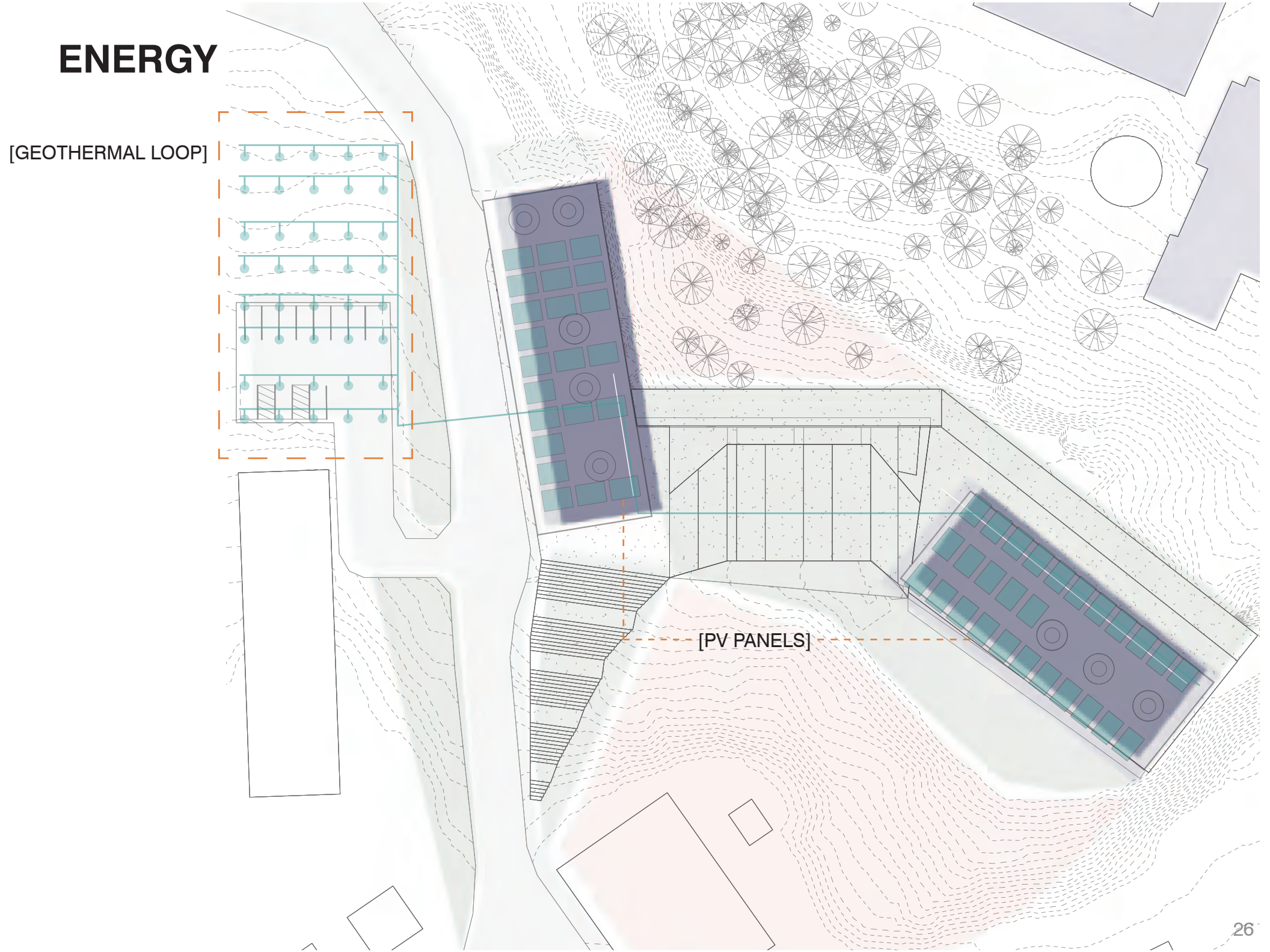
ENERGY



The rooftop hosts a series of photovoltaic panels set at an angle of 37.90 degrees for maximum sunlight exposure. Little cloud cover and constant sunshine makes the area a prime candidate for solar energy panels. According to the PV Watt Calculator, maintaining the recommended panel angles will generate an estimated 6,310 kWh/Year of clean, usable energy serving as the main source of the buildings on-site energy production.

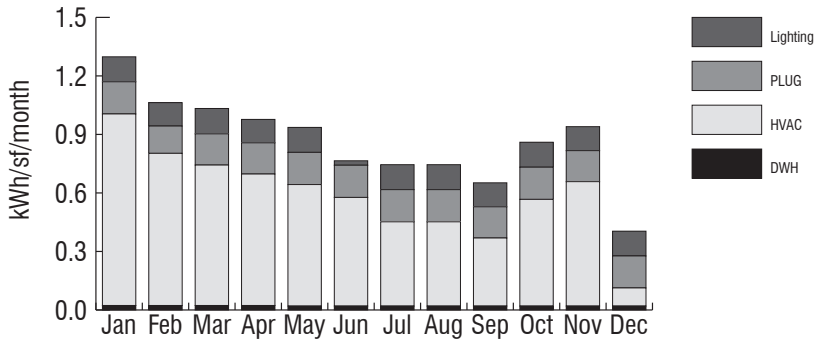


ENERGY



ENERGY

[TOTAL MONTHLY END USE CONSUMPTION]



[ANNUAL END USE SUMMARY TABLE]

	Calculated Energy Use (kBtu/sf/year)
HVAC	6.8
Lighting	1.4
Appliances and Plug Loads	3.4
Domestic Hot Water	0.28
Total Building Consumption	11.9 kBtu/sf/year
Total Exhibit Consumption	2 kBtu/sf/year
Gross EUI	24.9 kBtu/sf/year
Renewable Production	30.71 kBtu/sf/year
Net EUI	-5.83 kBtu/sf/year

[PV WATT CALCULATOR]

RESULTS

6,316 kWh/Year*

System output may range from 6,069 to 6,423kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Energy Value ($)
January	3.63	364	51
February	4.60	414	58
March	5.22	524	74
April	6.10	584	82
May	6.34	627	88
June	6.46	614	86
July	7.00	681	96
August	6.66	648	91
September	6.62	618	87
October	5.42	527	74
November	3.87	373	53
December	3.36	342	48
Annual	5.44	6,316	$ 888

Location and Station Identification	
Requested Location	3150 Paradise Drive, Tiburon, CA
Weather Data Source	(TMY2) SAN FRANCISCO, CA 19 mi
Latitude	37.62° N
Longitude	122.38° W

PV System Specifications *(Commercial)*	
DC System Size	4 kW
Module Type	Standard
Array Type	Fixed (open rack)
Array Tilt	37.9°
Array Azimuth	180°
System Losses	14%
Inverter Efficiency	96%
DC to AC Size Ratio	1.1

Economics	
Average Cost of Electricity Purchased from Utility	0.14 $/kWh

TRANSPARENCIES

ARCHITECTURE AT ZERO