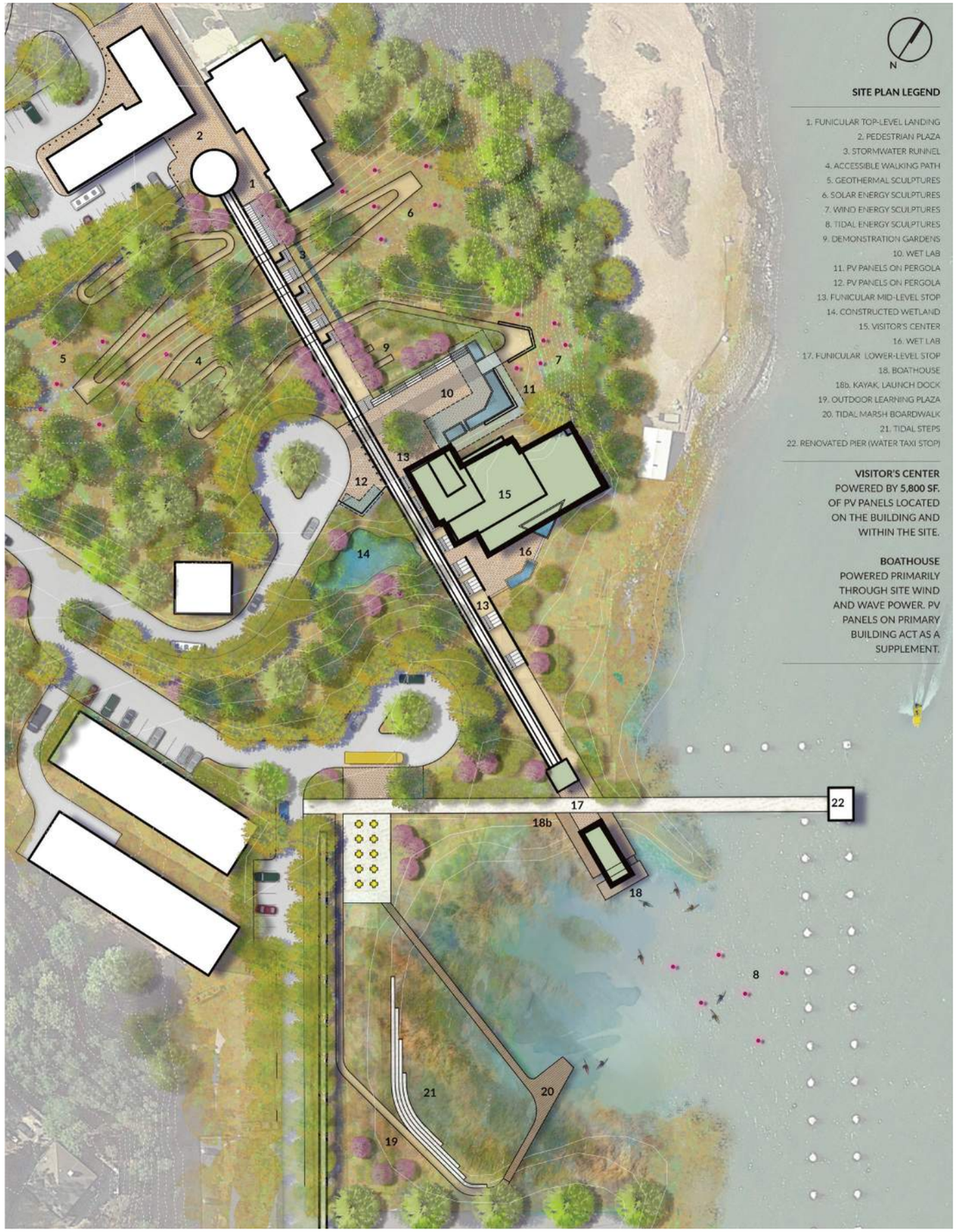
Bay Area Transect

Architecture At Zero
2018

Bay Area Transect invites visitors to explore the coastal ecosystem of Tiburon Bay as well as the sustainable technology used to power its



Bay Area Transect combines site-sensitive planning, zero-net energy design, and innovative placemaking strategies to build upon the Romberg Tiburon Center's vision of connecting science, society, and the sea.

The site's overall accessibility and vertical grade change is addressed with a water counterbalancing funicular which connects the waterfront with existing facilities at the top of the hillside. In addition to reducing the need for vehicular transportation throughout the site, the funicular also connects a variety of pedestrian options, such as a monumental stair and an accessible walking path that offers panoramic views to the bay.

Throughout the site, passive and active landscape interventions provide a variety of educational experiences while supporting the overall net-zero goals and on-site renewable power requirements of the project. Bay Area Transect proposes a protected tidal inlet that allows beginner kayakers to explore and connect with the coastal ecosystem.

The Visitor's Center gently distributes the program across 4-tiers to minimize site disturbance and maximize daylighting and views to the bay. The natural grading of the site and proposed stacking of the program allows for passive ventilation measures to significantly reduce the energy required to ventilate the building. The Boathouse, is a multipurpose waterfront pavilion that acts as an activated terminus of the site funicular and connection to the tidal marsh boardwalk and renovated pier.

The proposed alterations to the San Francisco State Romberg Tiburon Campus have a simple goal: to allow visitors to explore the coastal ecosystem as well as the sustainable technologies that power its preservation. With that in mind, Bay Area Transect illustrates how good design and appreciation for the natural environment go hand in hand.

High Performance Buildings

High performance buildings integrate and optimize energy efficiency, durability, life-cycle performance and occupant productivity.

Photovoltaic Shade System

The wall mounted photovoltaics do double duty. They generate renewable energy as well as provide shading to the windows which helps with glare as well as reduces heat gain.

Drought Tolerant Plants

By using plants that are drought tolerant they are able to survive in periods of high heat and/or droughts without the need for irrigation.

Subterranean Parking

By locating parking below grade it eliminates hot, impervious surfaces from being located above grade. These surfaces when located above grade produce add to the heat island effect, as well as, create stormwater runoff in stead of allowing water to absorb into the earth.

Geothermal Wells

Geothermal wells take advantage of the earth's temperature to naturally assist in the heating and cooling of the building. In the summer the earth absorbs heat from the system and in winter transfers heat to the system.

Rainwater Harvesting

Rainwater harvesting is a way to conserve water. Rainwater is collected from the site and roofs and stored in a tank for use in toilet flushing within the building. This reduces the amount of potable water that is used to operate the building.

Photovoltaic Panels

Photovoltaic panels located on the roofs and facade of the building generate renewable solar energy. The panels produce a min. of 60% of the buildings energy use.

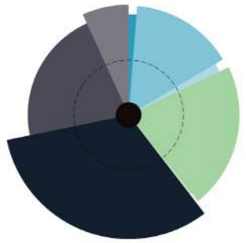
Solar Thermal Panels

Solar thermal panels located on the roof use the heat of the sun to produce hot water. This water can be used to provide hot water to sinks and showers as well as heat the pool.

Energy Calculations for Bay Area Transit

SEGMENT	KWP /YEAR	
HEATING	**1,183**	**1%**
AHU	0	0%
ZONES	1,183	1%
HUMIDIFICATION	0	0%
COOLING	**15,534**	**16%**
AHU	14,388	15%
HEAT REJECTION	0	0%
ZONES	1,146	1%
FANS	**20,540**	**22%**
AHU	20,239	21%
ZONES	301	0%
INTERIOR	**50,578**	**54%**
LIGHTING	30,237	32%
EQUIPMENT	20,231	21%
PUMPS	**6,317**	**7%**

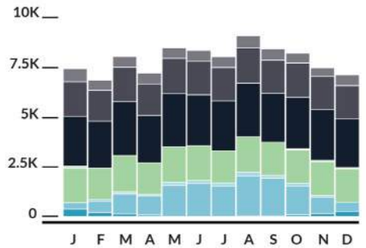
ANNUAL ENERGY USE



94,152

KWH PER YEAR

MONTHLY ENERGY USE



PROJECT EUI

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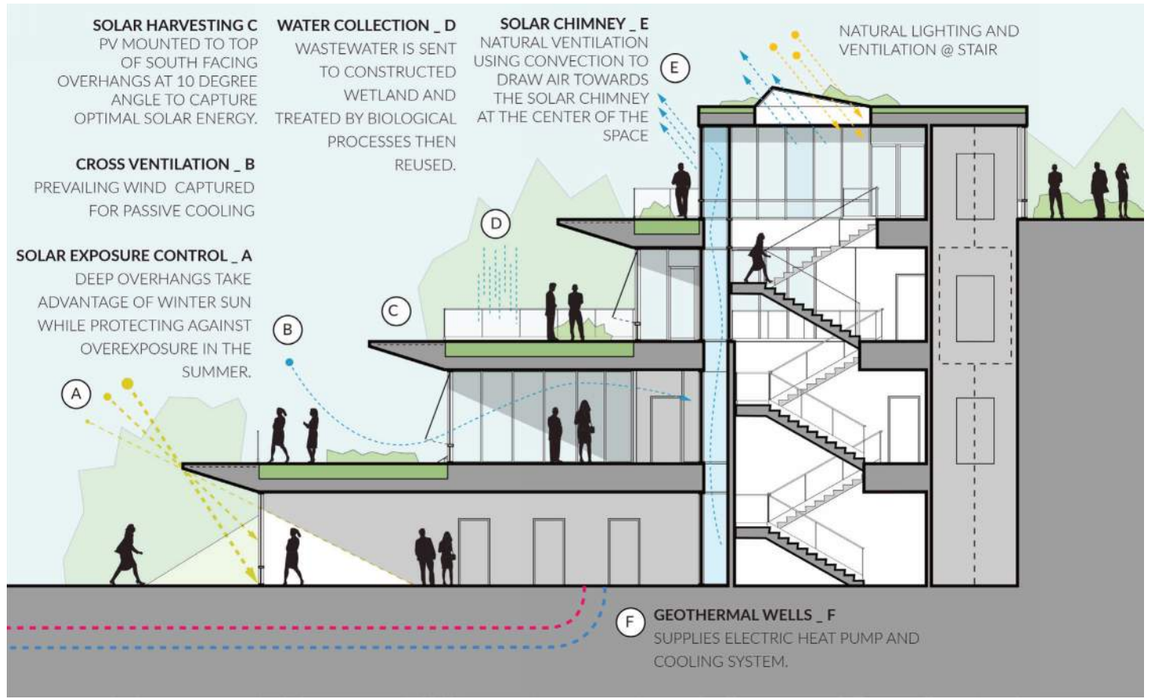
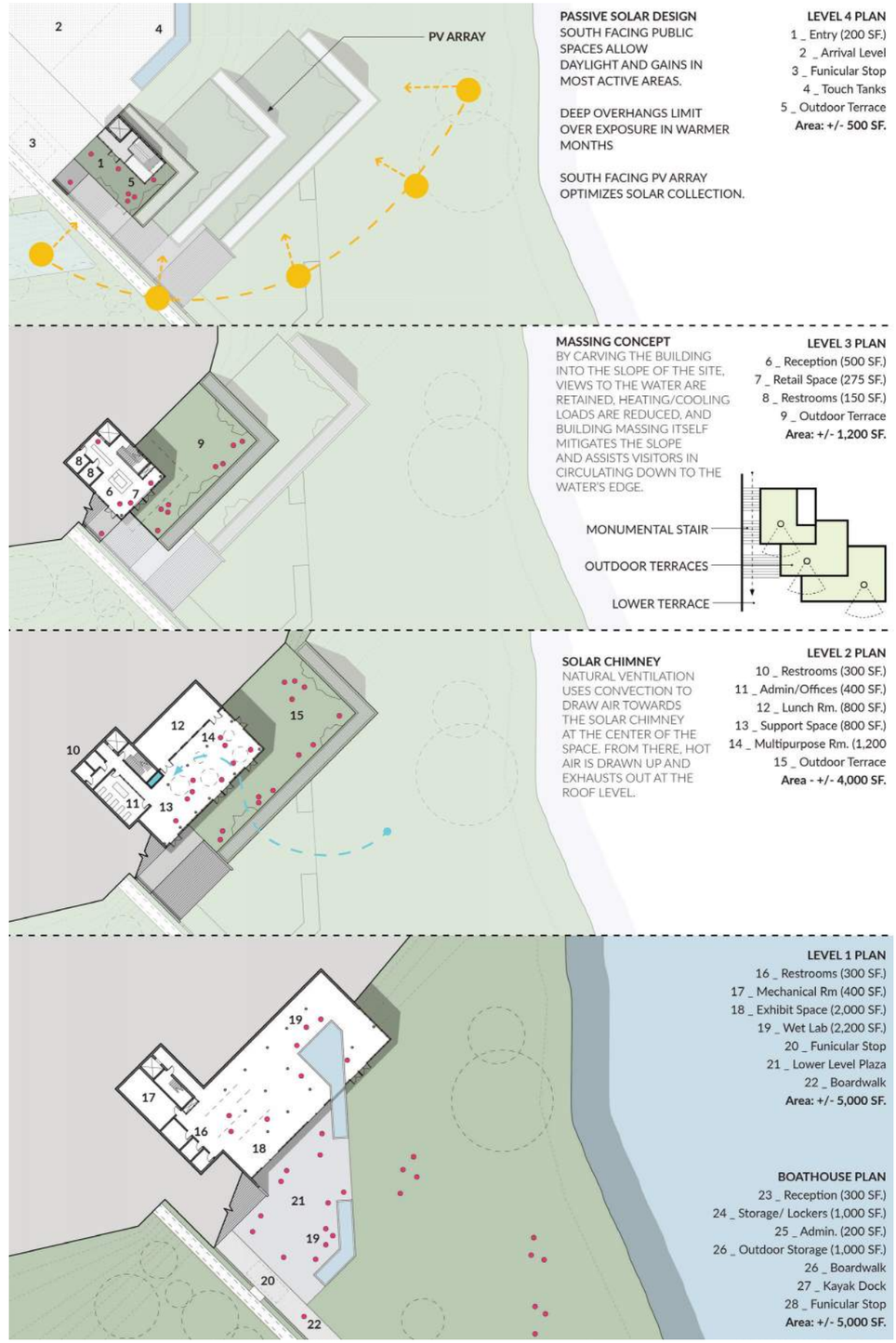
Visitor's Center





Site Narrative

Circulation

- Keep vehicular traffic and operations to the edges of the site and create a pedestrian core

- Connect key areas with a variety of pedestrian options, including accessible options, that respond to the site's topography and views

Education

- Approach sequence for students and visitors would be to get dropped off at the plaza near the top of the building; the plan moves key elements into that plaza (touch tanks, demonstration gardens, PV pergola, pavilion with PV roof, overlook to constructed wetland) so that the mission of the center is literally front and center

- Create a language of vertical elements throughout site that serve as markers/examples of various alternative energies; cluster them in a way that responds to their respective resources sun, wind, water) and tie them together with an educational trail

- The protected tidal inlet allows beginner kayakers to explore a protected area and the design affords a route from the boathouse, around the tidal turbines, over to the boardwalk, and back.

- The boardwalk in the protect tidal inlet creates another zone of protection and lets people get up close to a variety of water/vegetation conditions

Site Sustainability

- Keep parking and large impervious areas high up in the water shed to reduce stormwater runoff directly into Bay, and use pervious paving and other low-impact materials and details

- Stormwater at upper parking area will be captured in a swale and brought to the demonstration gardens, and expressed in the landscape. It will cross the educational trail and be another learning opportunity

- Funicular as a self-sufficient technology

- Major excavation (cut) will take place at building, shoreline restoration area, protected tidal inlet, and constructed wetland

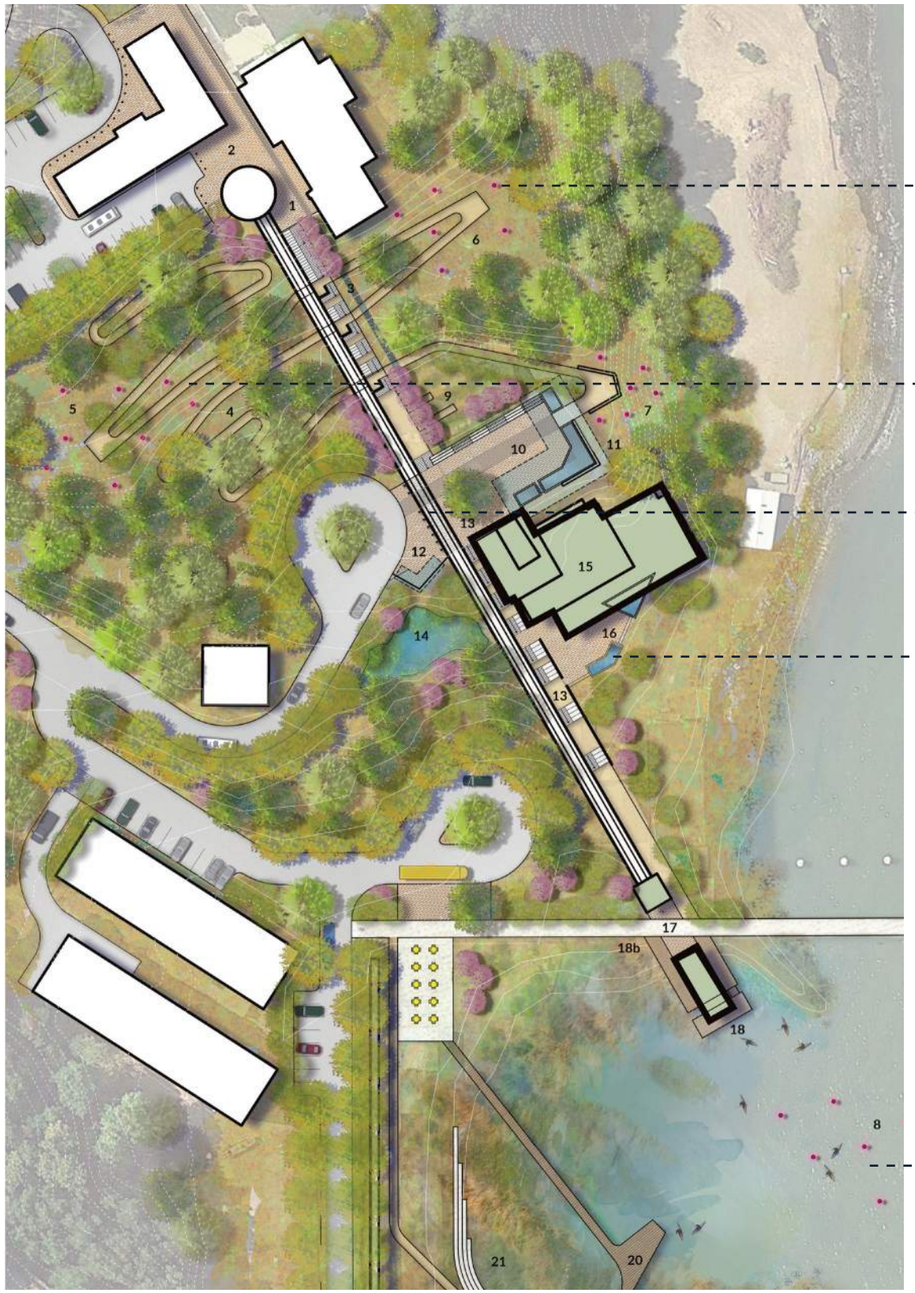
- Excavated soil (fill) will be used to sculpt a ridge at the central spine of our proposed site and make the slope along that path more consistent (from one building to the other), and to shape the shoreline in a way that protects the protected tidal inlet

- The area that receives that fill will be restored to exemplify the pre-settlement condition of the local landscape (vegetation, soils) – the lower level of the building spills out onto a plaza that overlooks this

- Minimize disturbance

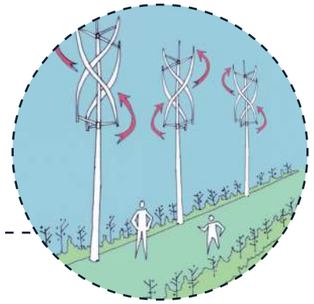
- Use sites of demolished buildings for compatible parts of program like plazas, drives, and infrastructure to take advantage of previously disturbed and graded land

- Reuse infrastructure and buildings wherever possible



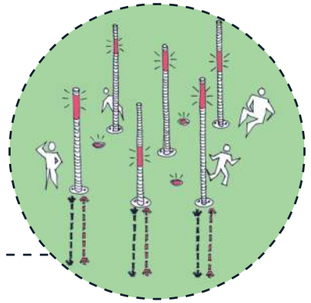
Wind Energy Sculptures

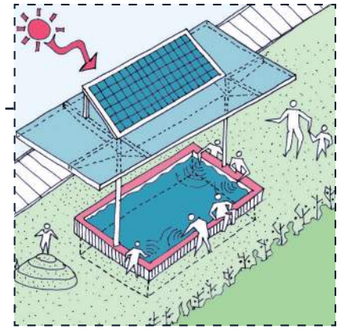
Small wind turbines are attached to masts throughout the boardwalk so visitors can interact with the collection process.



Geothermal Markers

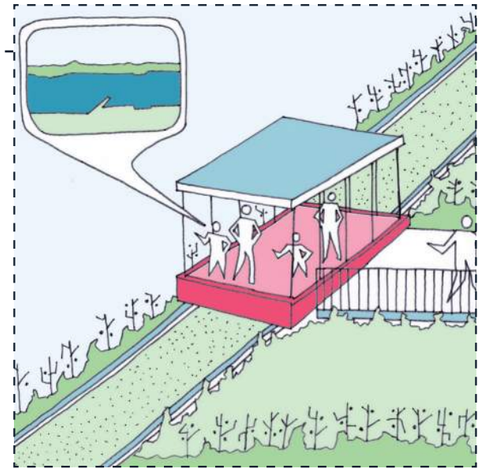
The geothermal wells used to power the buildings are marked by vertical poles which illustrate the activity of the well below.





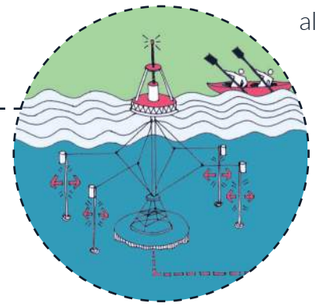
Touch Tank PV Canopies

PV canopies are mounted above the touch tanks at the arrival level to shade visitors in the warmer months while generating energy.



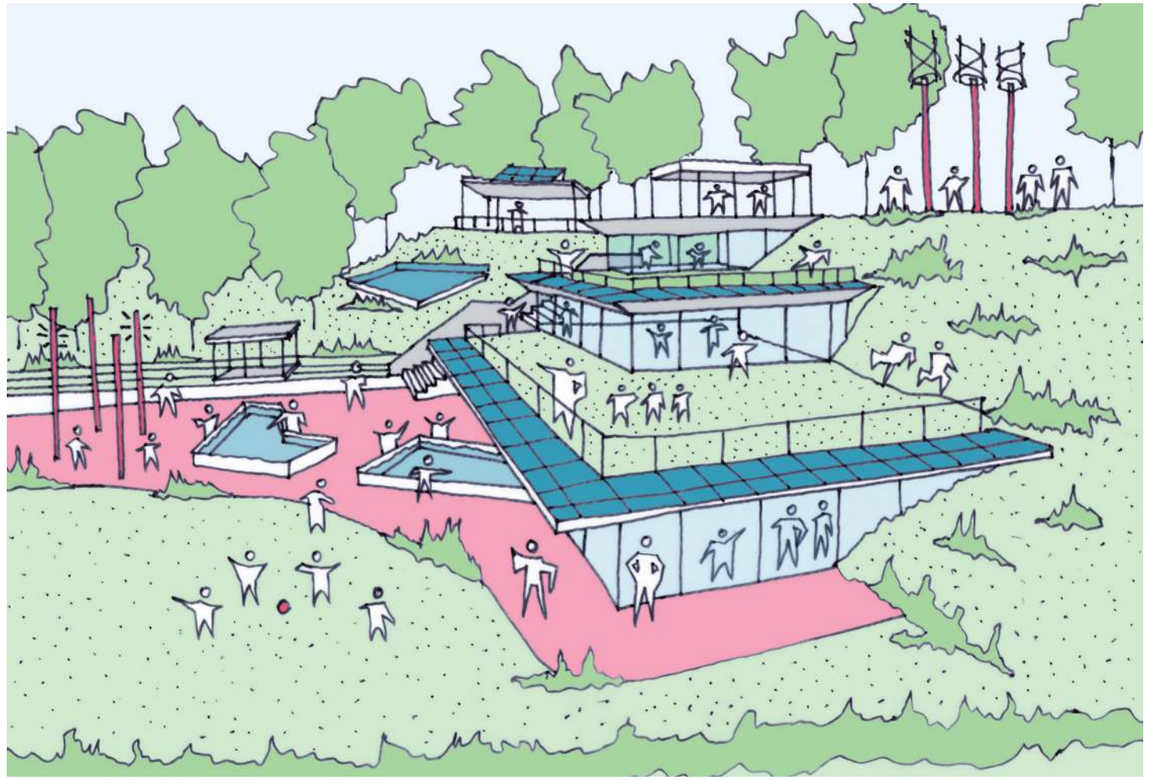
Water Powered Funicular

The funicular is powered by gravity and a water-based counterweight system, allowing it to operate energy neutral.



Wave Energy Buoys

Wave energy buoys are located in the kayak dock area, allowing visitors to get a close-up look as part of their paddeling route.



The Impact of Occupant Engagement

If buildings continue to use as much energy as they do today, carbon neutrality will remain an elusive goal as global energy demand increases at a rate that outstrips expanding renewable energy production. Occupants of identical buildings can affect annual energy consumption by as much as 400% based on their unique use of a space. Hence the conventional wisdom that net zero energy (NZE) should start with load reduction, while true, tends to overlook the most important energy reduction strategy—instilling occupant commitment to achieving NZE performance.

Understanding how occupants use a building, and gaining their commitment to energy conservation goals, is key to the performance of that building. When design concurrently meets users' programmatic needs and supports energy conservation a culture of positive energy behavior is created.

Occupant Engagement

For developing a conceptual design like Bay Area Transit and seeing it to fruition, create a plan of engagement that spans from the pre-design phase through post-occupancy. The following steps will support the implementation of the plan:

Educate

Once the plan of engagement is in place, reach out to the occupants. It is necessary to educate them with background details on energy use and develop common language for upcoming discussions.

Know, Ask, Listen

Interactive discussions with occupants will allow the project team to truly know the occupants. Make sure to ask the right questions and be sure to listen.

Respond

After meeting with occupants and/or using surveys to collect information, it is important for the project team to let the occupants know what they've learned and what the design implications might be.

Prioritize

Projects have site constraints, construction budgets and other factors that may limit how many of the design solutions can be incorporated into the project. Understand what the energy impact of each solution is and how closely the solution aligns with other goals of the occupants, then prioritize which elements to implement.

Repeat

Once a building is occupied, there are communication vehicles that need to be ongoing to be sure everyone knows how to use their space. It is especially challenging to engage occupants who inhabit buildings for only a short-time before moving on and therefore tend to have a short-term perspective that rarely aids energy performance. Real-time energy displays can be used to promote mindfulness and frequent re-training is also essential, whether at the outset of every school year, residential tenancy or business cycle.