

HONORABLE MENTION



Project title:

EnviroLAB: A Response to Natural Forces

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When presented with the program, terrain, and existing built environment of St. Croix, rules were decided upon for how design development would proceed. First, in plan, the campus layout, circulation paths, and building walls would be generated along a grid based on the existing neighborhood of Judith's Fancy. Property and road lines were extended and paralleled onto the site, establishing a visual connection from the south and west to the existing neighborhood. Second, buildings should mimic the hills and mountains of the site and island in elevation. These hills have been shaped by four forces; two productive and two destructive, each of which lines up to a Cardinal Direction. The Earth is a productive force which pushes northward into the sea. Nature is a Westward productive force which grows over Earth from the bay. Wind is an Easterly destructive force which flows over the island. The sea is a destructive force from the North, composed of tides, waves, and storm surges, that directly opposes the Earth Force. Though location and footprint were established with the grid, building form was generated from the sculpting and weathering properties of each force.

Once these rules were established, building locations were chosen. A weathered building form was desired, so the Southeast portion of the site was chosen as the general area of construction, as it offered the most dramatic culmination of forces. Labs were placed at the top of the hill, so that any fumes or odors exhausted by it would be evacuated by the Easterly breezes, and would not enter the other buildings. Community outreach, offices, and education were placed adjacent to the lab, to encourage communication, demonstration, and observation between these programs. Housing was placed lower on the site, to offer residents privacy and a sense of home. The dock/dive/maintenance building was placed adjacent to the optimal ocean depth, and sits on the Northeast tip of the site.

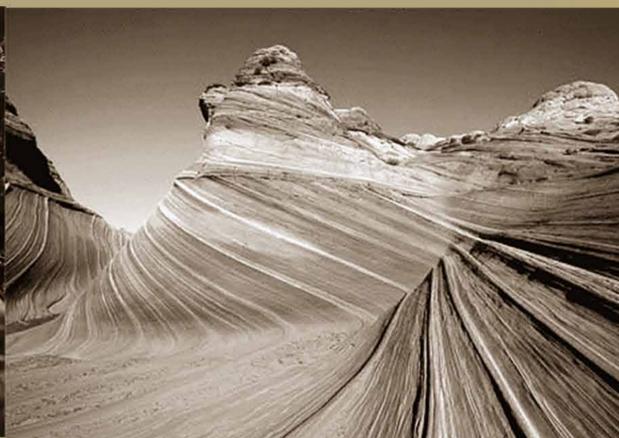
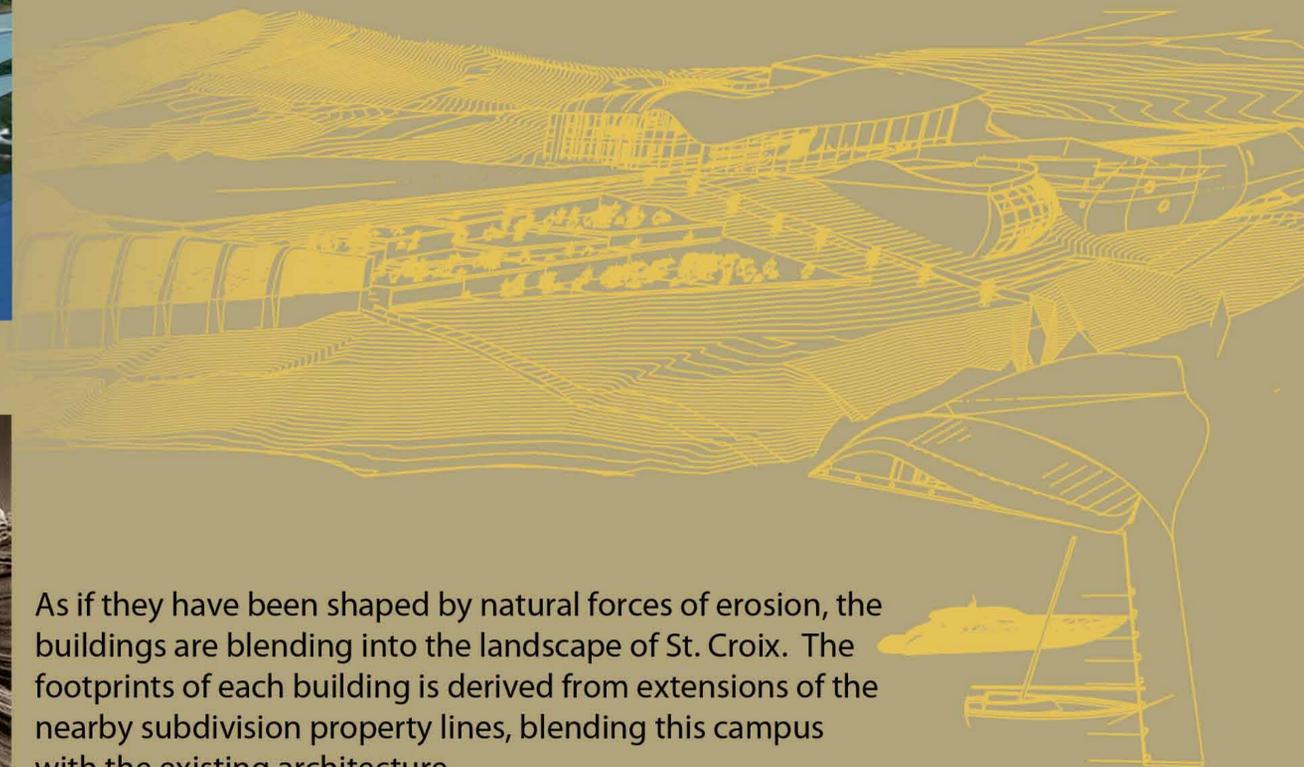
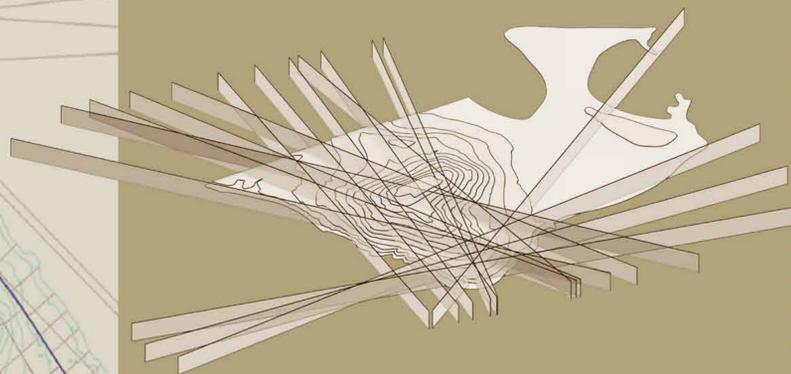
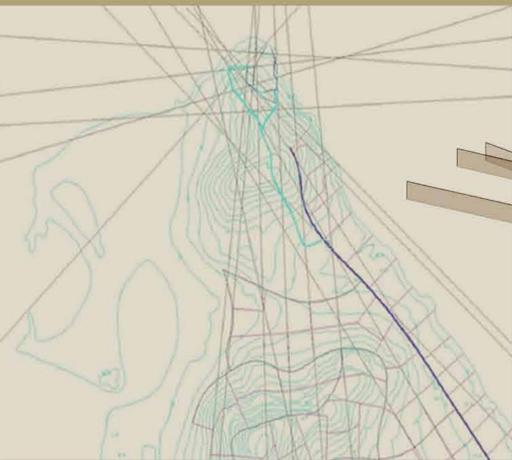
The first step in the building design was to minimize need for mechanical ventilation and electrical lighting. Housing and laboratories feature a specially designed structural passive ventilation machine. Hollow, prefabricated glass-fiber reinforced concrete arches, channel air up from the cool underground, through the building, and exhaust through the top, or rear through a solar chimney. Rammed earth wall desiccant effects will lower ambient humidity, and are featured throughout. An Ocean Thermal Energy Conversion system will supply the majority of the energy to the campus, and produce some of the potable water required for campus use. The NetZero water requirement led to the development of a constructed wetland in the center of the campus, to treat wastewater generated by the buildings.

The most important building of the campus, the lab, is constructed in a way that will provide flexibility to its users. Electrical outlets in the floor allow laboratory equipment to be arranged and accommodate a variety of situations including private work, group work, and demonstrations. The open circulation paths provide an area for discourse between tests and experiments.

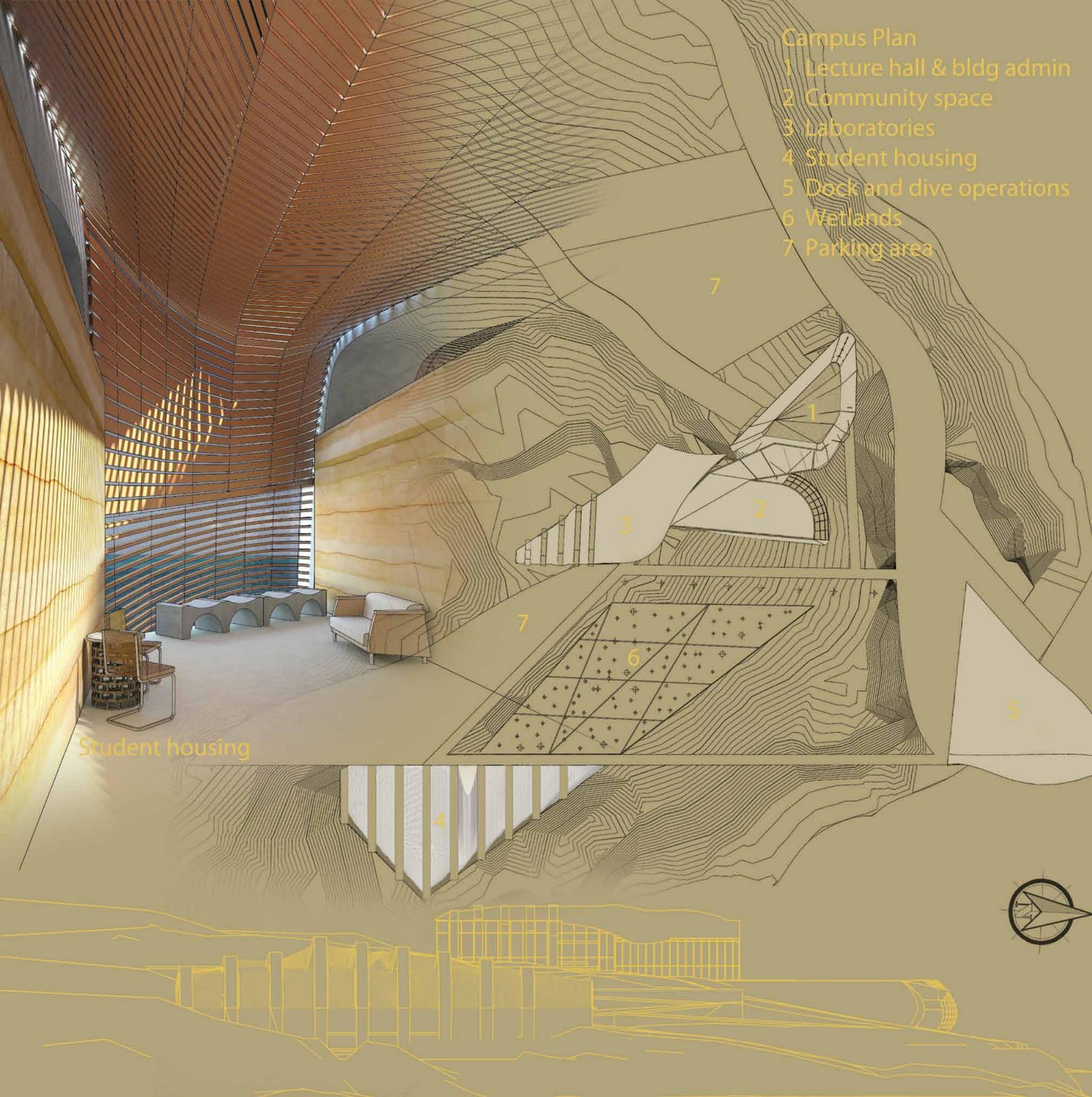
EnviroLAB: A Response to Natural Forces



Photo: Alex Dyer



As if they have been shaped by natural forces of erosion, the buildings are blending into the landscape of St. Croix. The footprints of each building is derived from extensions of the nearby subdivision property lines, blending this campus with the existing architecture.



- Campus Plan
- 1 Lecture hall & bldg admin
 - 2 Community space
 - 3 Laboratories
 - 4 Student housing
 - 5 Dock and dive operations
 - 6 Wetlands
 - 7 Parking area

Student housing

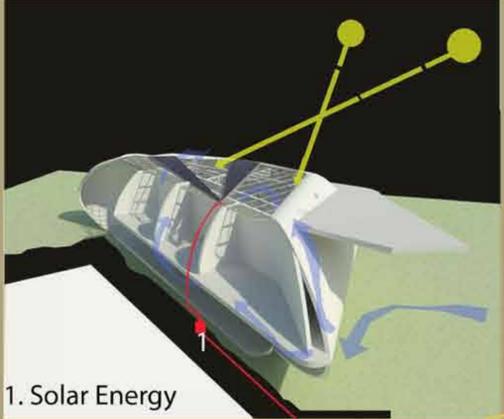


Climate aperture open

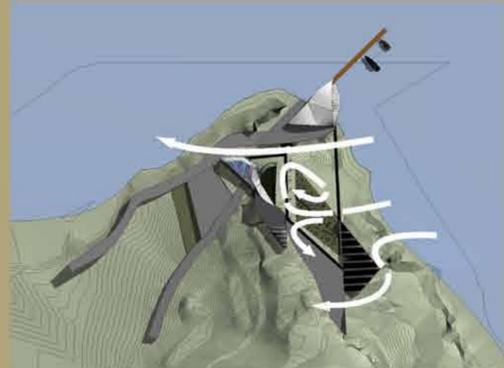
Climate aperture closed

The dock and dive operations building includes a climate sensitive architectural element. As a storm approaches, the canopy is able to close in order to protect the glazing from wind damage.

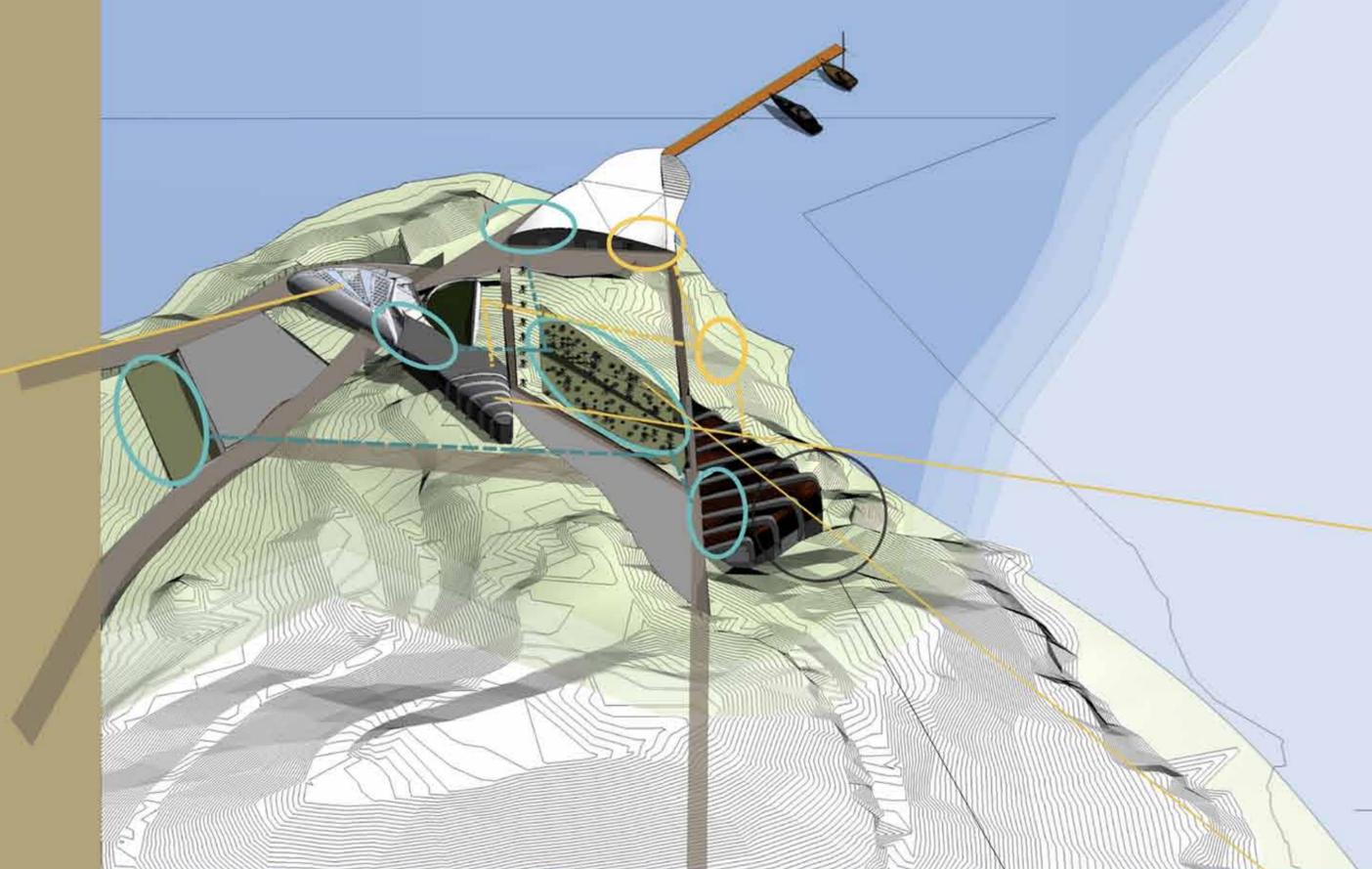
Storm surge is managed by a break away southern wall. In the event of a surge, the bay doors are easily removed, allowing for flow through the first floor in order to keep the overall structure intact.



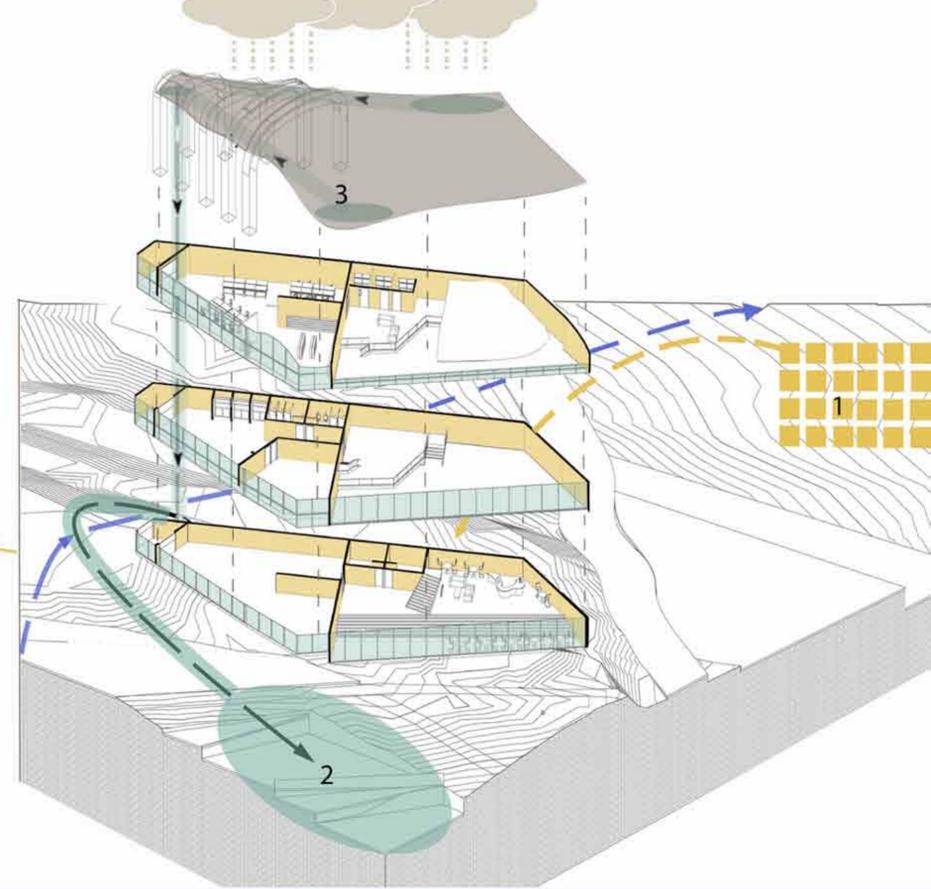
1. Solar Energy
Photovoltaics On Administrative Building/ Lecture
1. Rain water collection



Wind Flow: building orientation was informed by the direction of wind on site. Shape and the fenestration of each building improves the indoor air quality.

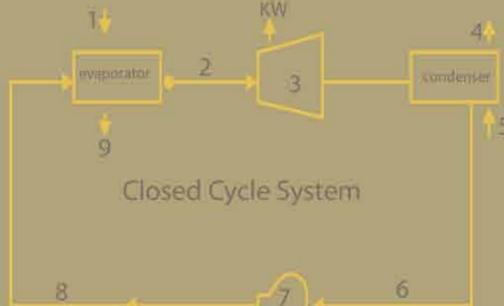


Environmental Resources Utilization

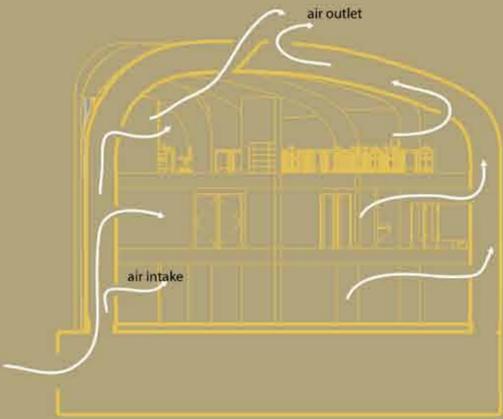


Laboratory axonometric

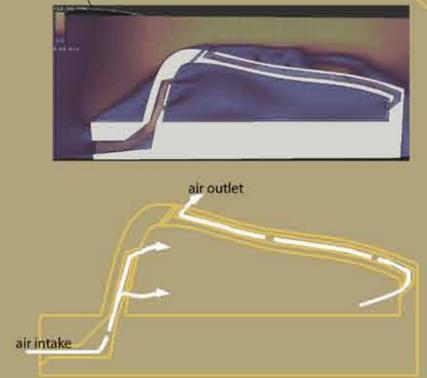
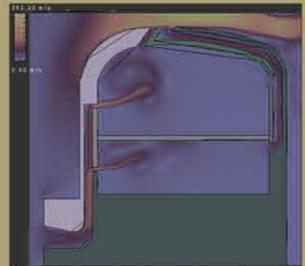
- 1. solar pannels,
- 2. wetland
- 3. collection of rainwater



Ocean Thermal Energy Conversion (OTEC)
 1. Warm water in
 2. Working fluid vapour
 3. Turbogenerator
 4. Return to sea
 5. Cold water in
 6. Working fluid condensate
 7. Working Fluid feed pump
 8. Working fluid
 9. Return to sea



Laborator Airflow
showing the airflow in the laboratory building

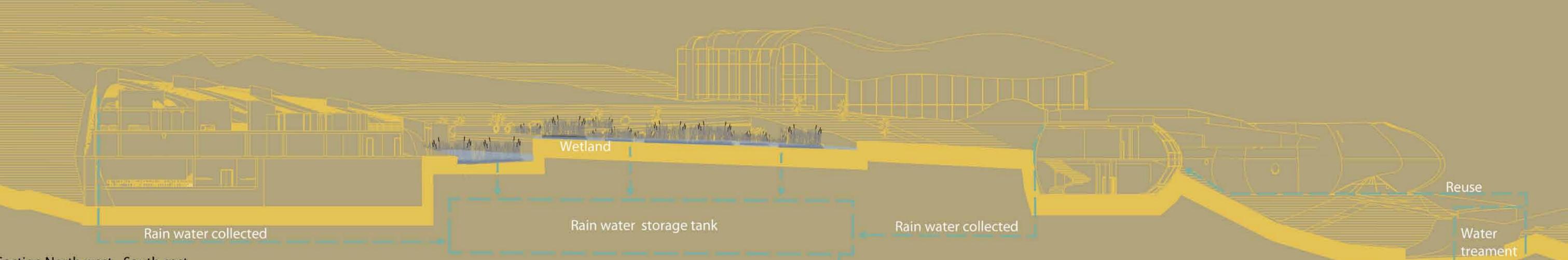


Housing piers



Wetland Section

Water collected from the roof is sent to the wetlant for purification and aqutic life breeding.



Section North west - South east

Reuse
Water treatment



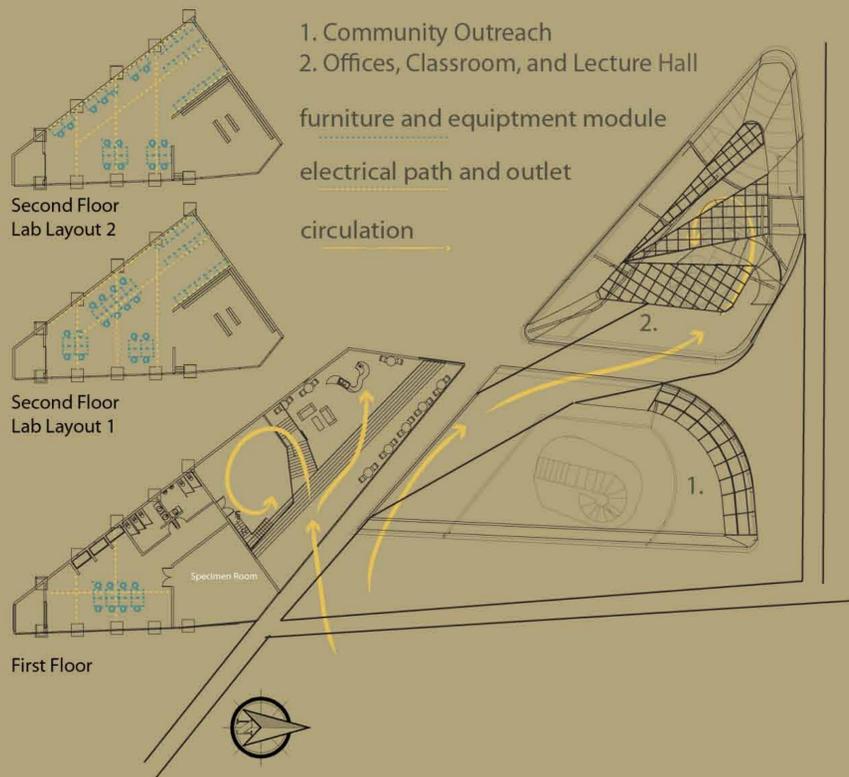
Current design meets 2030 challenge for College/University

Design building Energy Use Intensity 66 kBtu/sqft/yr
Baseline building Energy Use Intensity 120 kBtu/sqft/yr

Proposed total carbon emission: 94.8 tons CO2/yr

Energy Breakdown:

heating	9%
cooling	0%
lighting	42%
equipment	49%



Circulation targets open and large social spaces inside the laboratory and throughout the campus. These spaces encourage impromptu student gatherings and interactions between the scientists to converse about current projects.



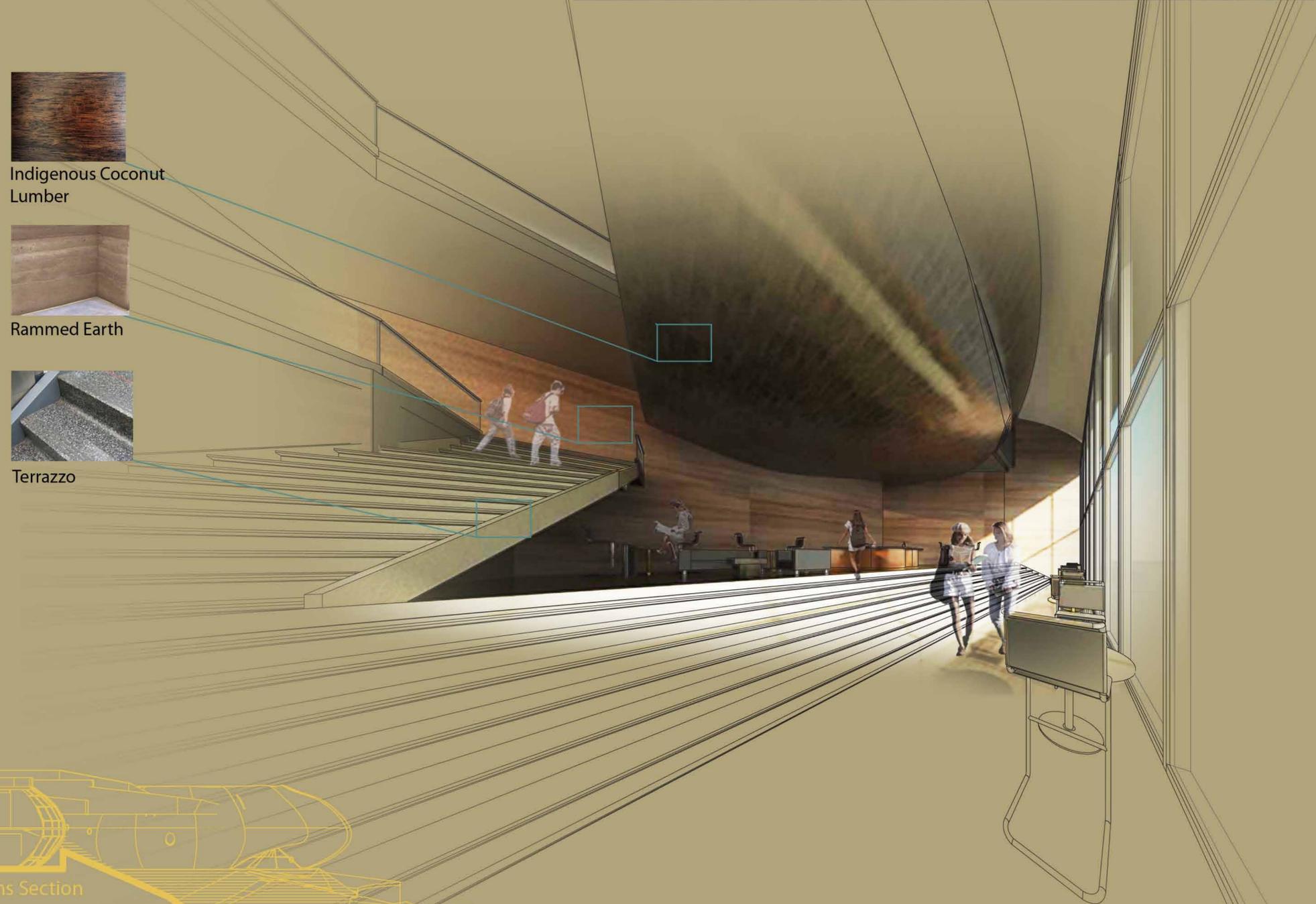
Indigenous Coconut Lumber



Rammed Earth



Terrazzo



Laboratory Elevation

Classrooms Section