

HONORABLE MENTION



Project Title:

ZeroEnergyResearchOutlook

Faculty Sponsor:

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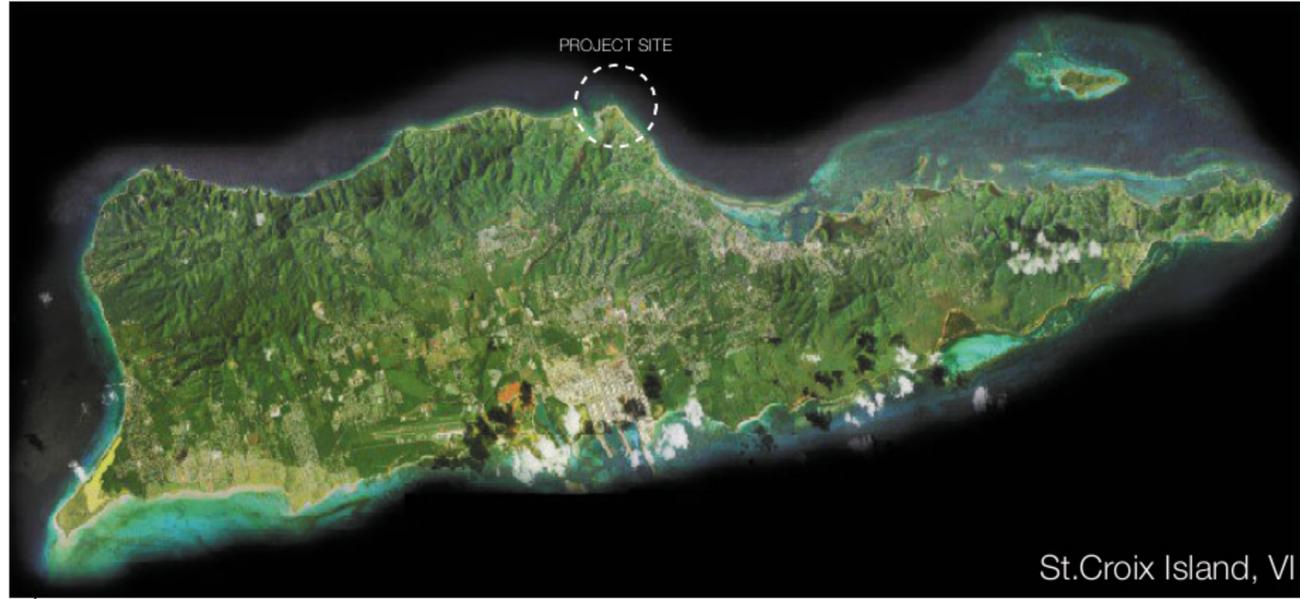
Like many islands, St. Croix, Virgin Island is almost 100% dependent on imported oil for electricity. Since little fresh water is available, imported oil is even used to desalinate the water. The goal of U.S. Virgin Islands is to reduce the use of fossil fuels by 60%. Furthermore, this sustainable laboratory will not use any fossil fuels. In addition, the laboratory will produce more than enough energy to export the fuel to nearby neighborhoods.

In order to achieve this feat, the laboratory incorporates many different systems for energy efficiency and generation. The list of systems used is mentioned above (top right corner of this board) and the explanations for these systems are visually depicted in boards one, two, three, and four.

The location of the building is strategically placed behind the hill. As the same reason as the existence of the view shed, it is likely that the neighboring houses would also appreciate if there were no buildings taller than tree lines blocking the view toward majestic mangrove forest. In order to connect laboratory with dock and parking lot, streets are made closed to automobiles, and park was landscaped in place. The park includes various plants from around the island for educational purpose and bike rentals are available at the parking lot for more enjoyable travel. The dock and its pathway are raised ten feet above the waterline for two purposes: to make the dock habitable even during hundred-year-flood, and to avoid the trunks of precious mangrove trees.

Shuttle busses are provided for staff members living within certain vicinity of the laboratory campus. The shuttle busses will use algae-biodiesel and electricity that are produced from the algae farm. A similar form of zip-car (also using bio-diesel and electricity) will be available for staff use. The zip-car will be parked in the parking lot behind the laboratory building, alongside the handicapped vehicle parking. This will be efficient for staff members who take shuttles to work or for staff members who are in rush. All deliveries to the laboratory will be made to this back parking lot with fire-truck turnaround.

While the student housings are located within the main building to encourage education, the staff housings are located near the parking lot to ensure convenient travel away from the campus. The staff housings are located in more private area because of the assumption that some of the staffs might have family members living together with them.



Plants around site



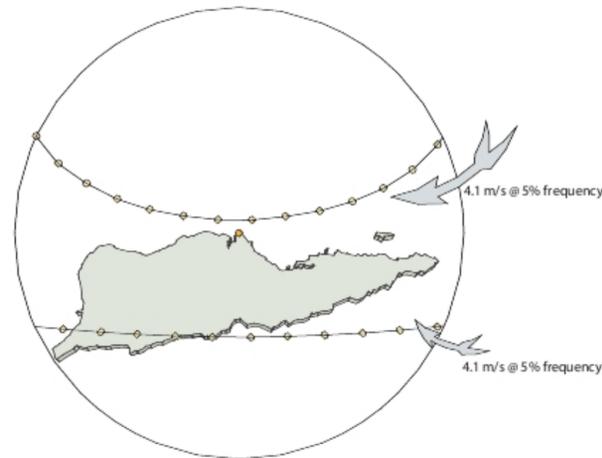
Weather in St. Croix, VI

The average dry bulb temperature of St. Croix is 82(F), with temperatures remaining relatively constant throughout the year with a typical swing of 10(F). There is very limited seasonal variation in temperature with modest diurnal temperature swings (day-night)

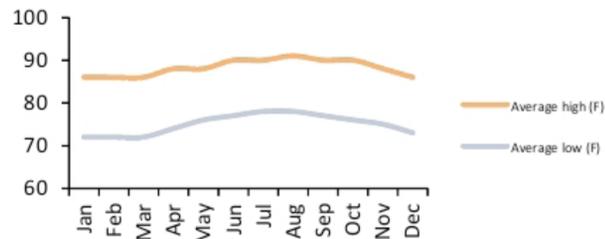
The Virgin Islands does not have a rainy season, however there are month to month differences. The rainiest months in the Virgin Islands are November, October, September, August, and May.

The relative humidity in St. Croix also has fairly limited seasonal variation, averaging approximately 70 percent and generally staying between a low of about 60 percent and a high of 90 percent.

The wind generally blows from the East throughout the year with mild swing from N-E to S-E.



Temperature analysis through out the year

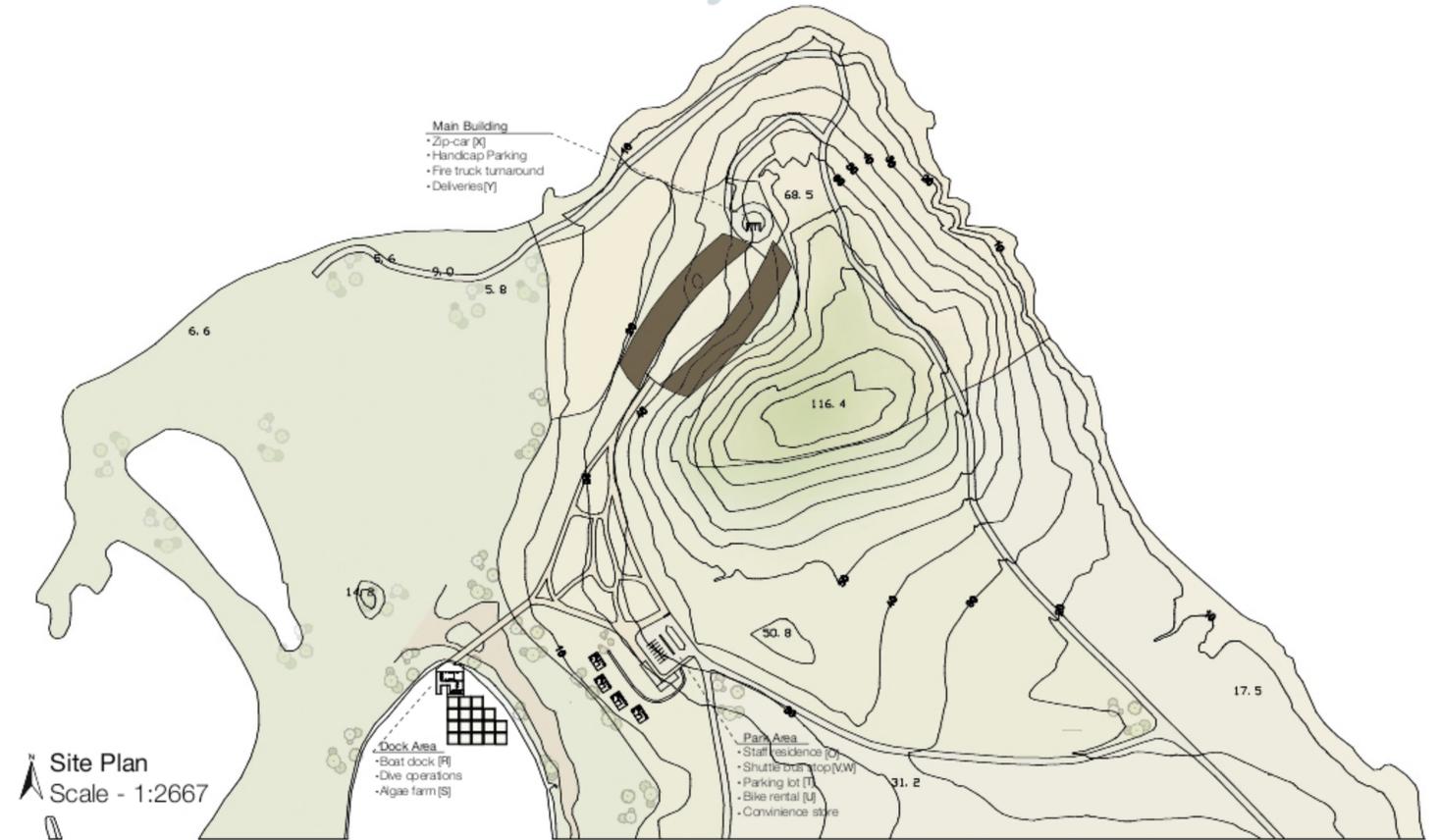


National Problems:

- Inefficient energy use.
- St. Croix does not have enough freshwater supply.
- U.S Virgin Islands are almost 100% dependent on imported oil for electricity.

Viable Solution:

- Energy Recycling
 - Wastewater Treatment/Recycling System
 - Algae Biodiesel
- Natural Energy Cultivator
 - Rainwater Harvesting
 - Solar Panel
 - Solar Chimney
- Green Energy
 - Geothermal Cooling
 - Solar Heat Collector
 - Algae Farming
- Uncultivated Comfort
 - Natural Ventilation
 - Green Windows
 - Evaporative Cooling
 - Light Shelf
 - Sky Window with Light-Distributor



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- LABORATORY**
- [A] WET LABORATORY
- [B] DRY LABORATORY
- [C] COMPUTER LAB
- [D] CLASSROOM SPACE
- [E] TEACHING LABORATORY
- [F] STORAGE FOR RECORDS/ARTIFACTS

- COMMUNITY OUTREACH**
- [G] K-12 EDUCATION FACILITIES, EXHIBITS, & TOUCH TANKS
- [H] CONFERENCE ROOM

- BUILDING ADMINISTRATION**
- [I] OFFICE
- [J] CLINIC
- [K] SECURITY OFFICE
- [L] JANITOR ROOM

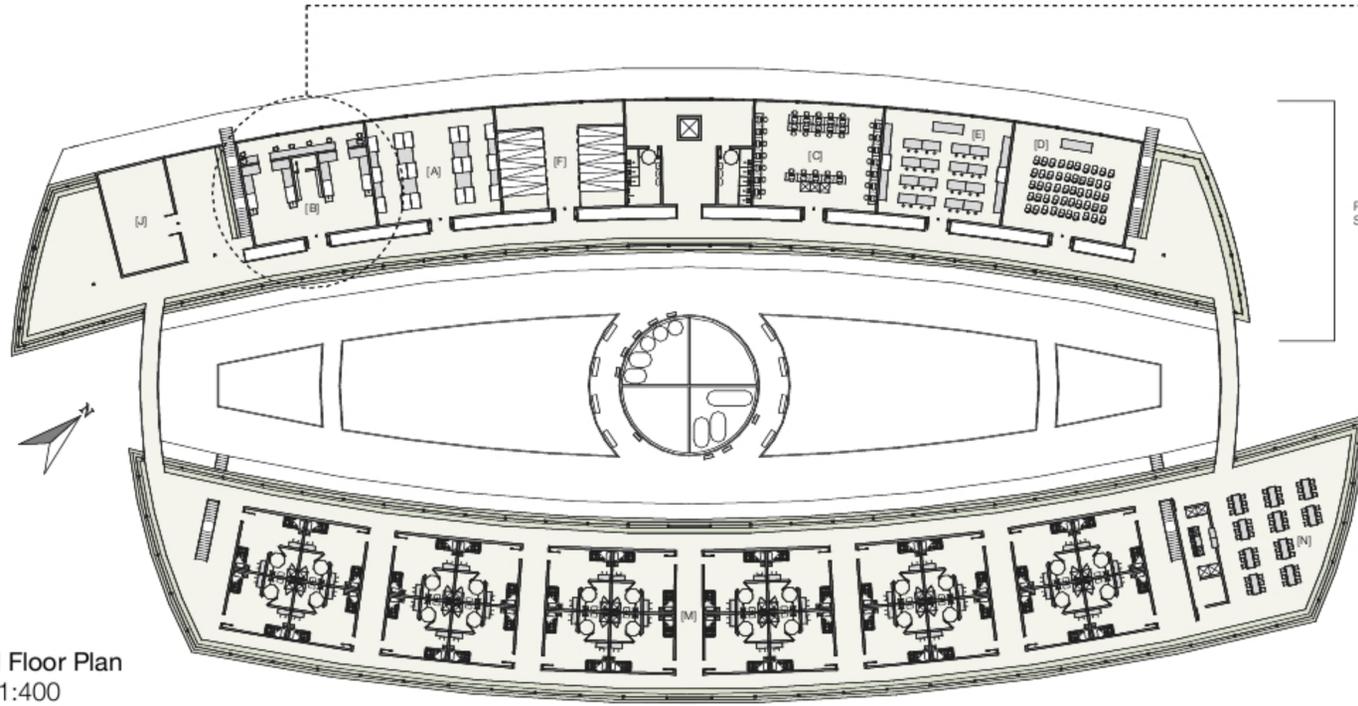
- LIVING/HOUSING ACCOMMODATIONS**
- [M] STUDENT RESIDENCES
- [N] DINING SPACE
- [O] STAFF HOUSING
- [P] PUBLIC SHOWER
- [Q] LOCKER ROOM

- BOAT DOCK/DIVE OPERATIONS**
- [R] DOCK
- [S] ALGAE FARM

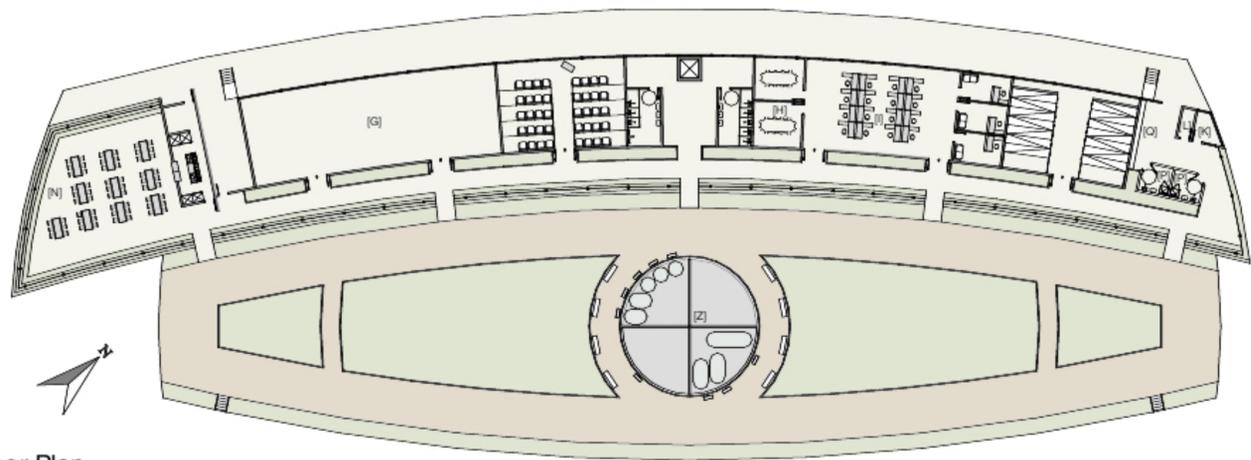
- TRANSPORTATION**
- [T] PARKING SPACE
- [U] BIKE RENTAL
- [V] IN-CAMPUS SHUTTLES
- [W] SHUTTLE BUS
- [X] ZIP CAR

- OTHER SPACES**
- [Y] LOADING DOCK
- [Z] MARSH/GARDEN

Second Floor Plan
Scale - 1:400



First Floor Plan
Scale - 1:400

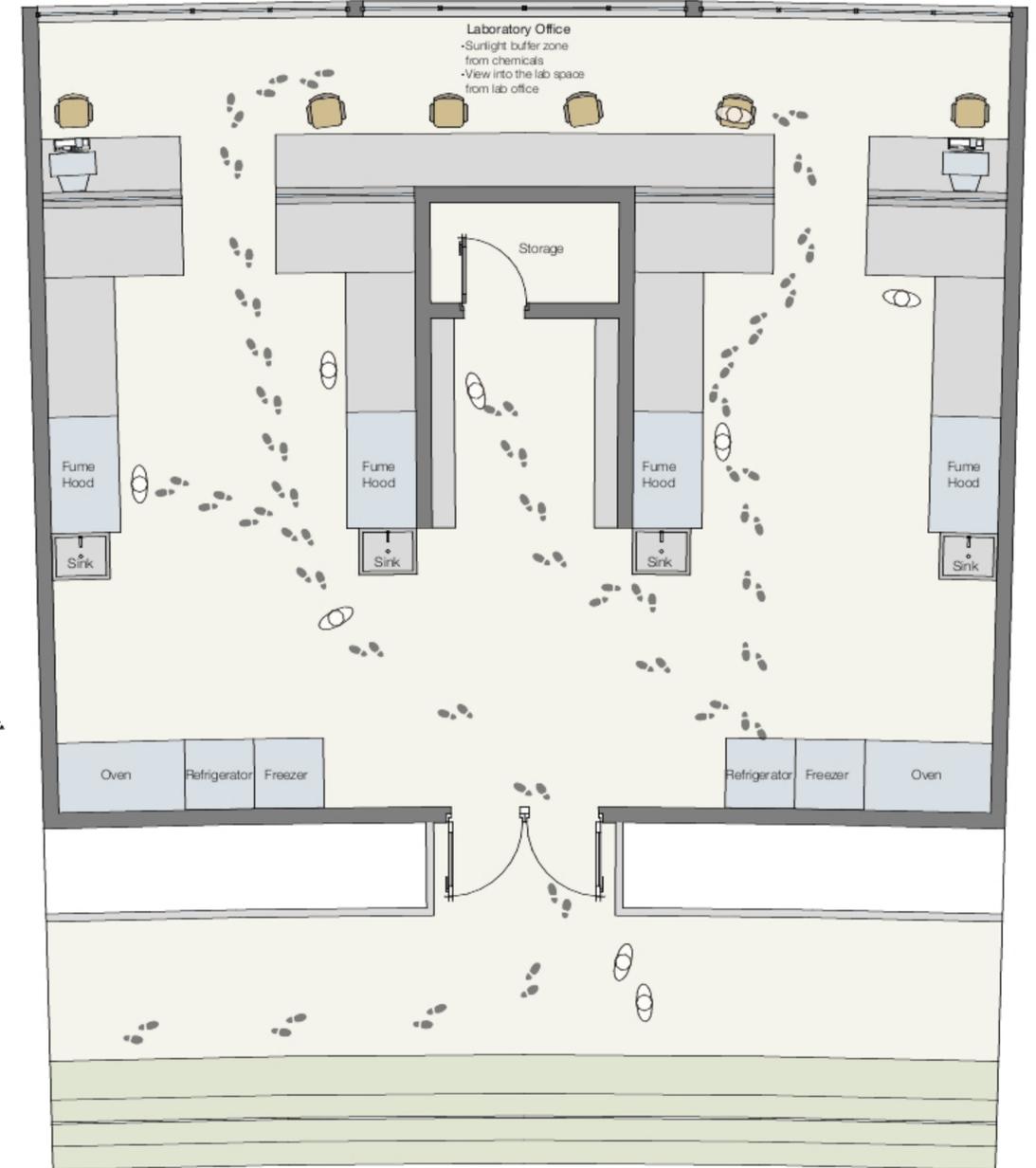


Laboratory Circulation

Public:
Students and Scientists

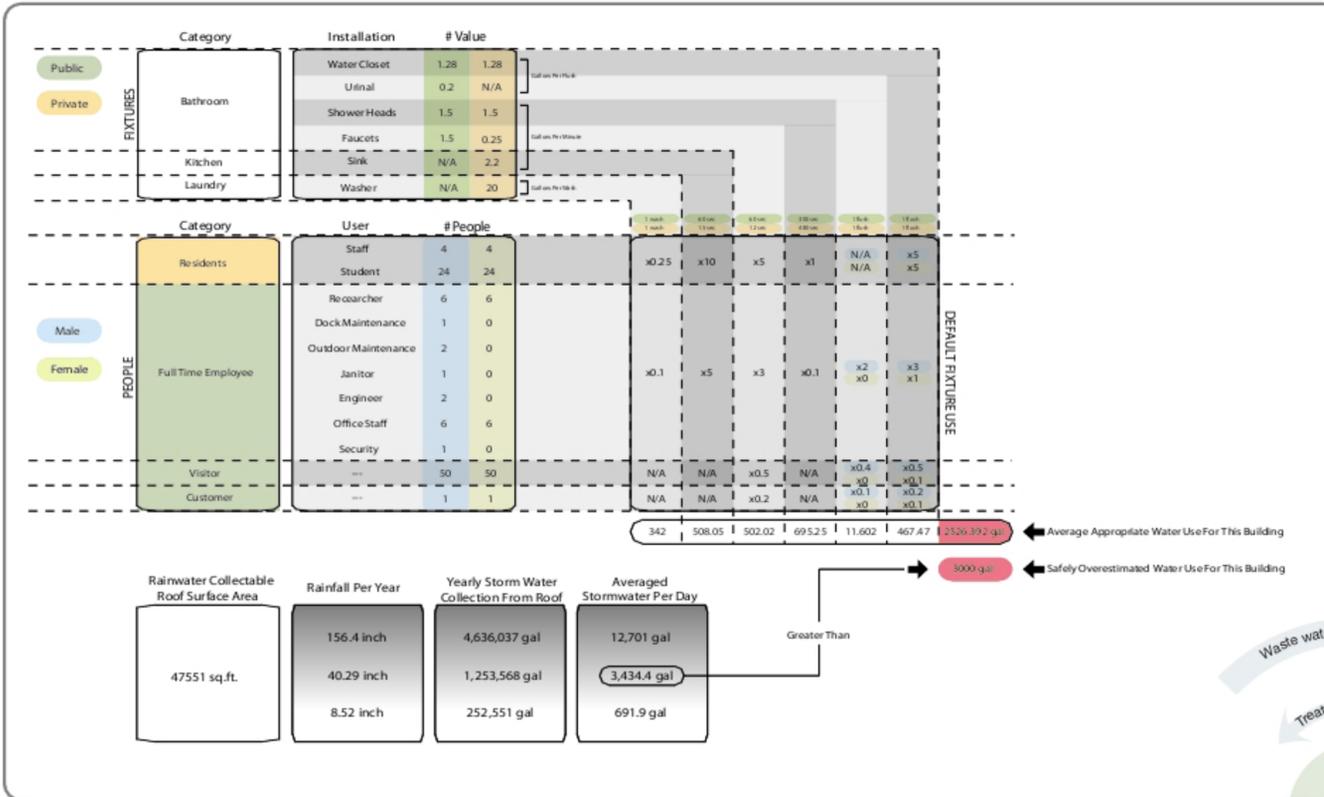
Private:
Residents

Public:
Visitors and Office Staff

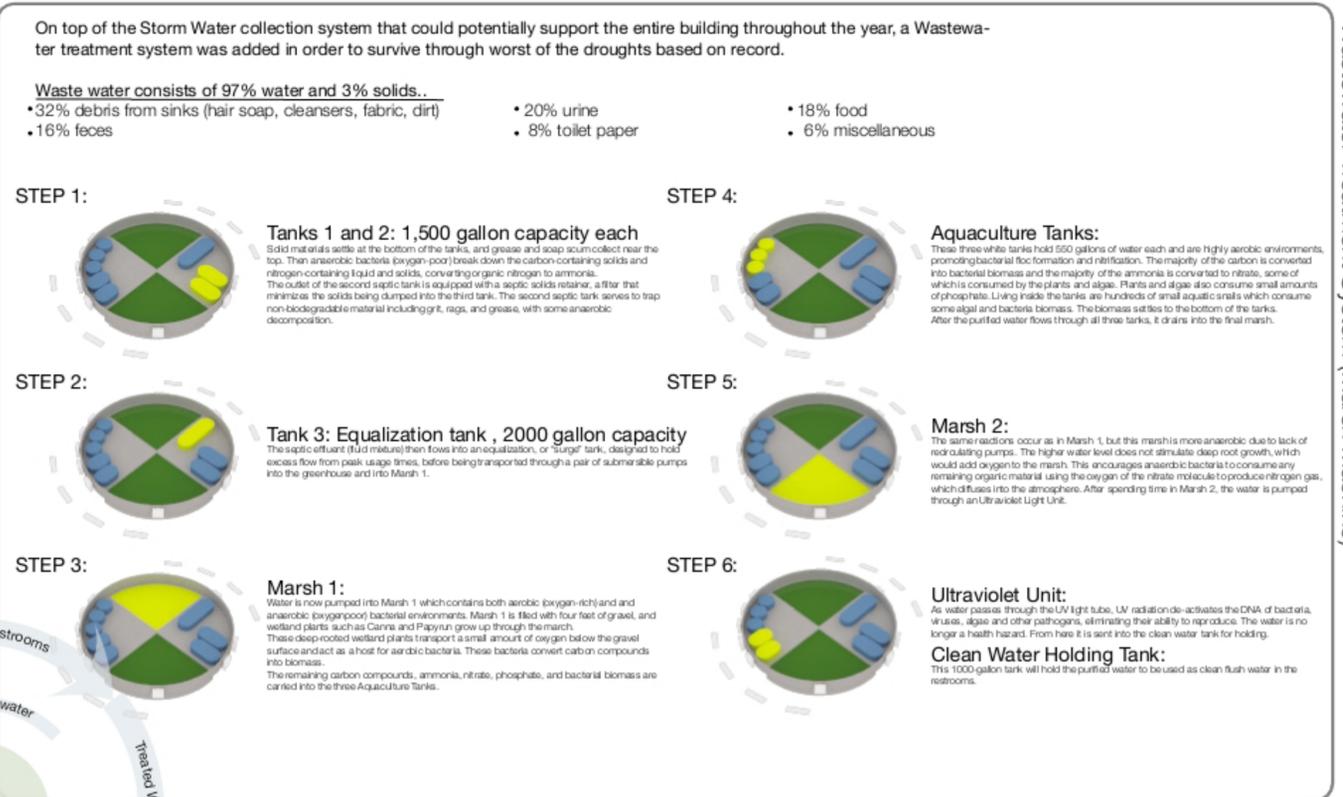


Laboratory Plan
Scale - 1:50

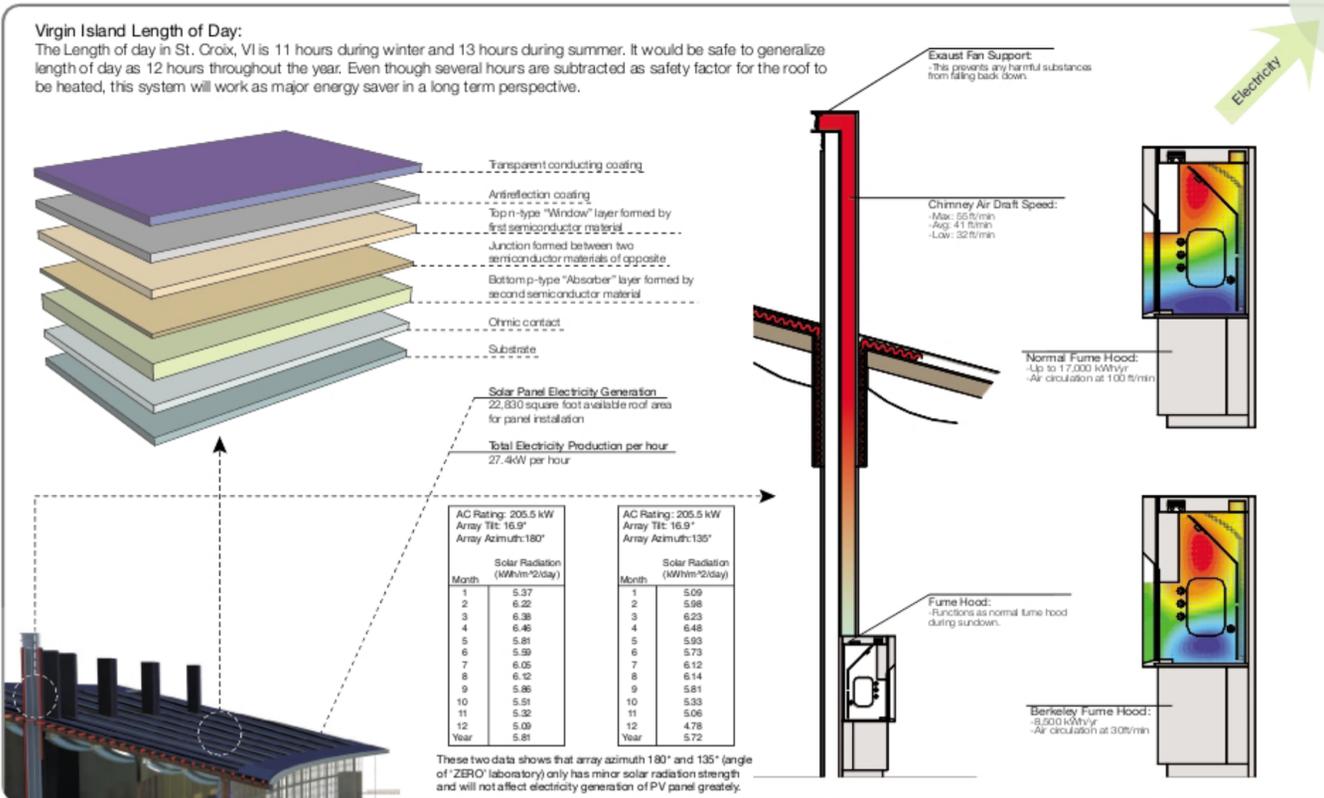
Rain Water Collection & Building Water Use



Wastewater Treatment System (Marsh Machine)



Solar Voltaic & Solar Chimney



Algae Farming

