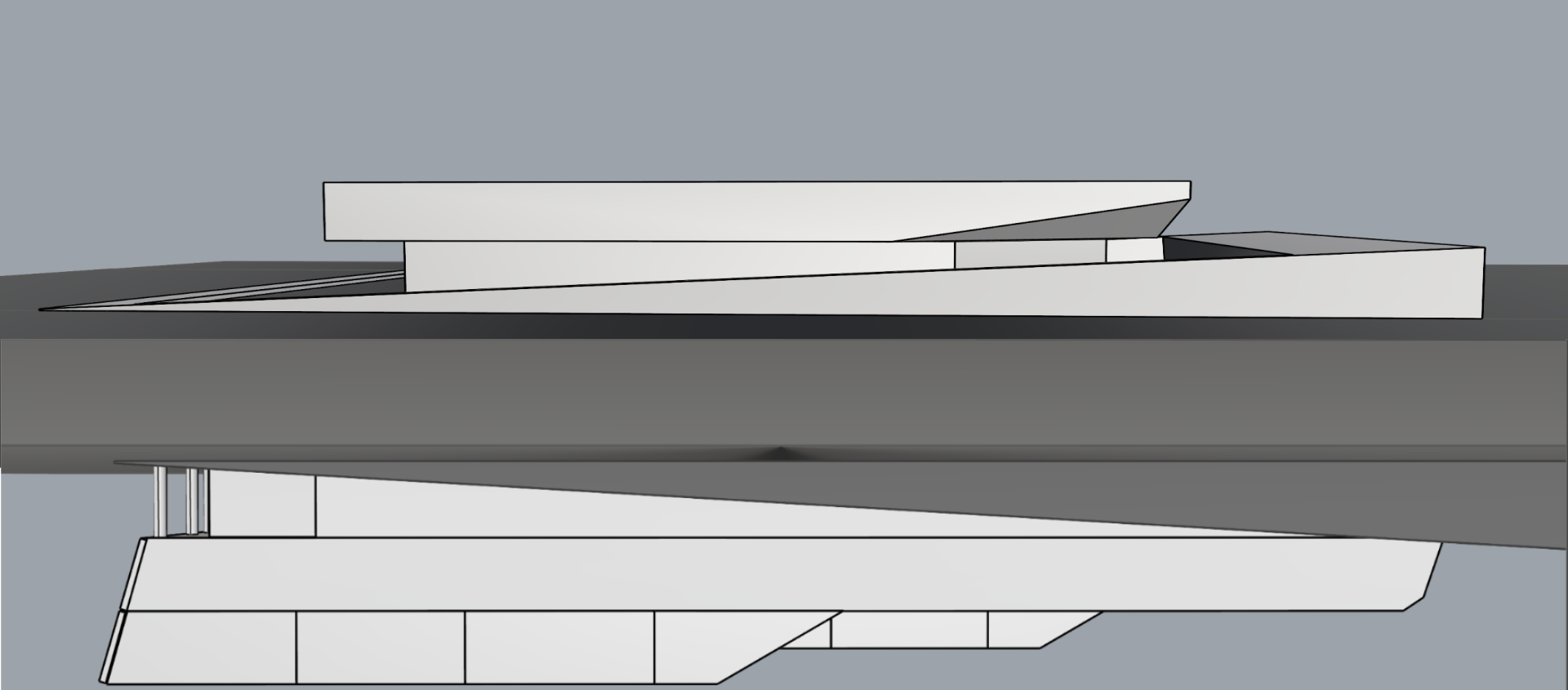
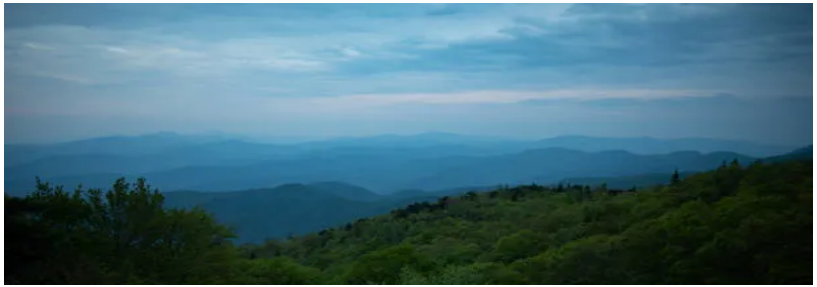


Sustainable Office in San Francisco

Tim Loeschen

Design Philosophy:



Hi there, my name is Tim Loeschen. I will be presenting a design for an office building on the coast of San Francisco.

My design philosophy is founded upon on modern applications of vernacular and earth-sheltered construction.

- I lived in a variety of climates and communities over my upbringing before living in Blacksburg, VA.
    - Plains, wetlands, and forested mountain ranges each had community with significant green space, placing importance on conservation.

From exposure to abundant green space and local concern for conservation, I gravitated towards study of varying vernacular methods of construction overlapping with modern sustainable design.

- Topology, coastal wind, and solar radiation exposure were the factors I attempted to concentrate my design towards, as these variables were the most consistent and reliable to look for sustainable solutions within my selected site.

+ Solar Gains
+ Water Conservation
+ Private Green Space
+ Passive Heating/Cooling

Precedents:

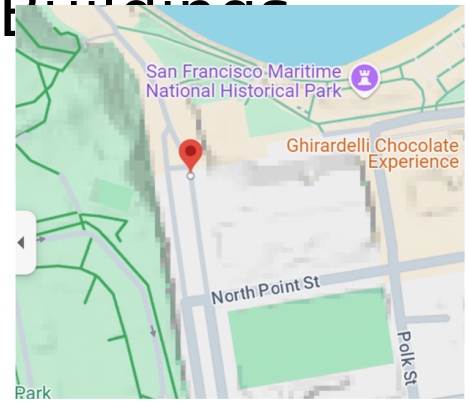
Exploratorium, Pier 15, San Francisco

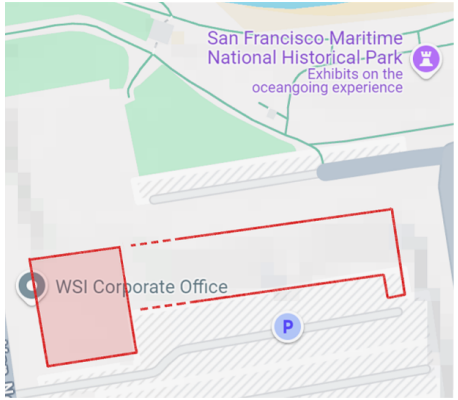
Architect(s): EHDD

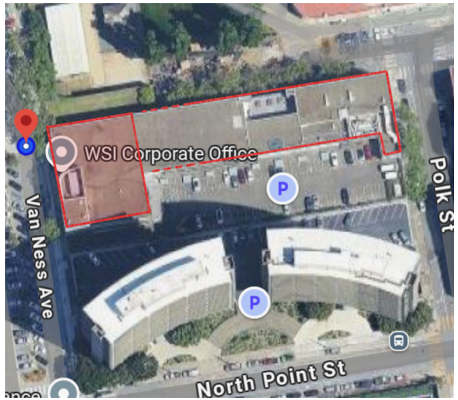
In precedents, I tried to find exemplary buildings seated in the same environment, that attempted to find sustainable energy solutions through utilizing the local environment in its design.

- This multi-purpose facility is designed to operate without gas and makes use of an innovative radiant heating and cooling system utilizing the bay tidewaters
- Building continues to be modified in the attempt of being the first Net-Zero museum in the world
- This building provides a good precedent due to its utilization of multiple natural forces to reduce energy consumption within the same climate of the selected site.

Climate Analysis: Topology, Location & Neighboring Buildings

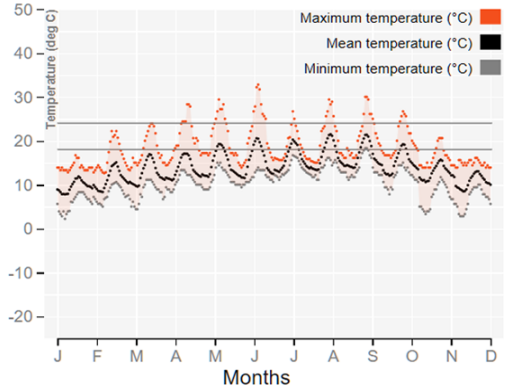


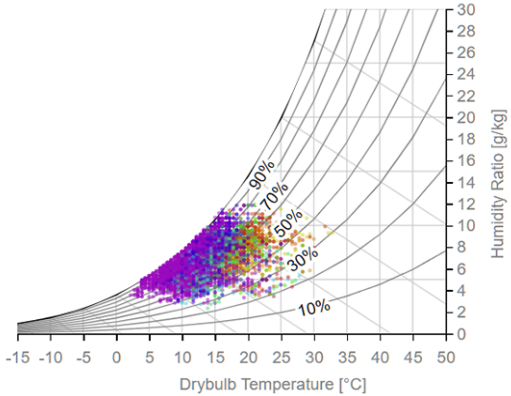


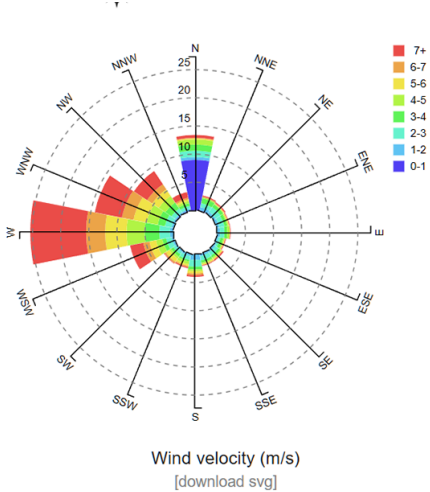


- The site, located on 3250 Van Ness Ave, San Francisco, was chosen due to its idyllic conditions of offshore coastal wind consistency, exposure to solar radiation and topology.
- This site provides a unique opportunity to harness natural forces in the attempt to reduce energy consumption in an office-setting while integrating the building with local environment.
- The site resides in the historical district of Fort Mason, and is centered between two historical parks with a condominium high-rise behind the site sharing the block.
- The section outlined in the red-highlighted square marks the area of the site I will be working with, as the full size of the site exceeds the spatial limitations of this proposal.
- Topology analysis reveals that the selected site is sitting on a natural slope overlooking the San Francisco Bay; Earth-shelter construction methods or building into the slope appear viable.

Climate Analysis: Climaplus

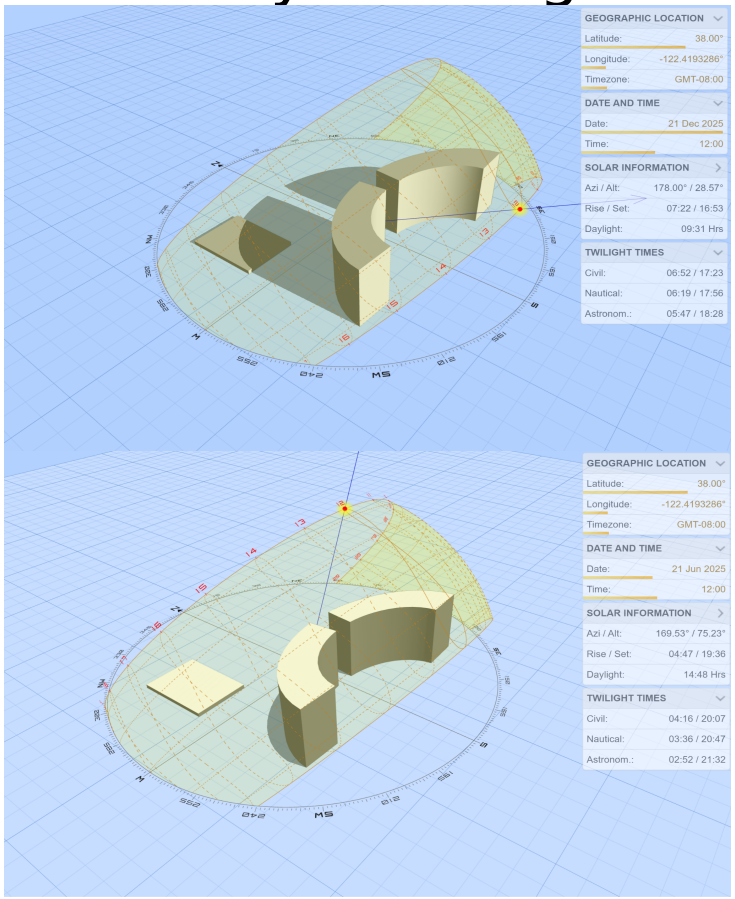






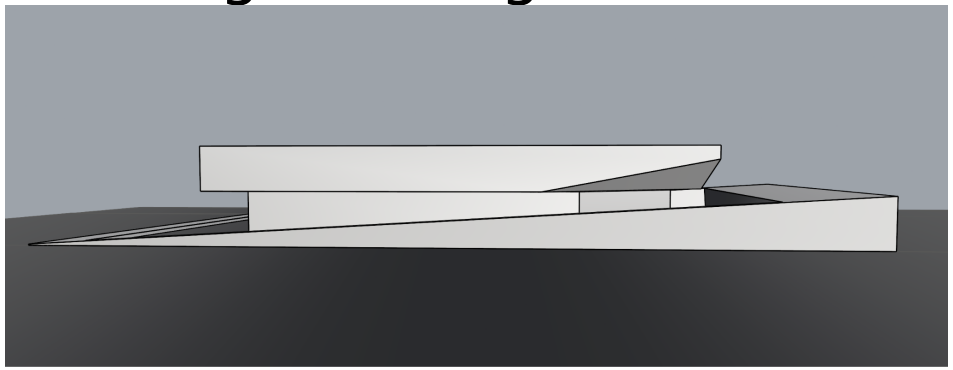
- The psychrometric chart yields a high humidity in the mornings and evenings, and if correlated with wind velocity analysis, would suggest a large quantity of moisture carried consistently by western off-shore winds.
- The monthly temperature graph suggests a mean temperature range of 18 - 26 degrees Celsius during business or operational hours ranging from June through September.
- High humidity will likely increase the sensation of heat uncomfortability within the building from June through September.
- Based on the data shown, the selected site is situated in a temperate climate with high probability for increased humidity levels. Effective dehumidification will likely be necessary for the building and occupants, but without need for energy-exhaustive cooling and heating systems.
- Water collection may be viable due to prevailing winds and recurrent high humidity

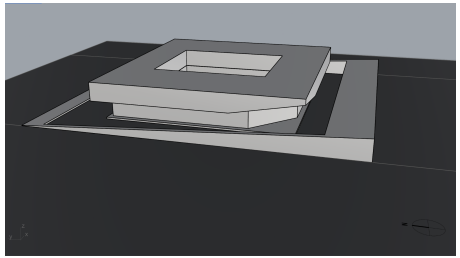
Site Analysis: Neighboring Buildings and Shading

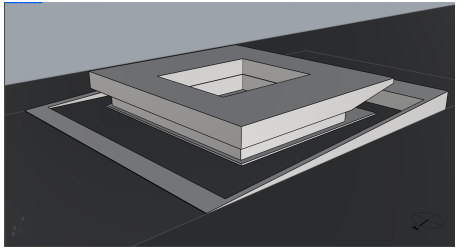


- The shading analysis was conducted in 3DSunpath to view shadow movement throughout the day/year from the adjacent buildings.
- Analysis reveals that 40% of the roof surface is unviable for PV installation during the approach and passing of the winter solstice
- South side of the selected building site loses approximately a minimum of 15%of solar gains from adjacent building cast shadows on the roof and southern-facade between the hours of 7:45 am to 11:45 am.
- PV massing will need to occur on the north-western portion of the roof/site if solar panel installation is to be considered further.
- Cafeteria could be placed in the southeast quadrant of the selected site where cast shadow may provide some cooling benefits for the facility or offloading food products

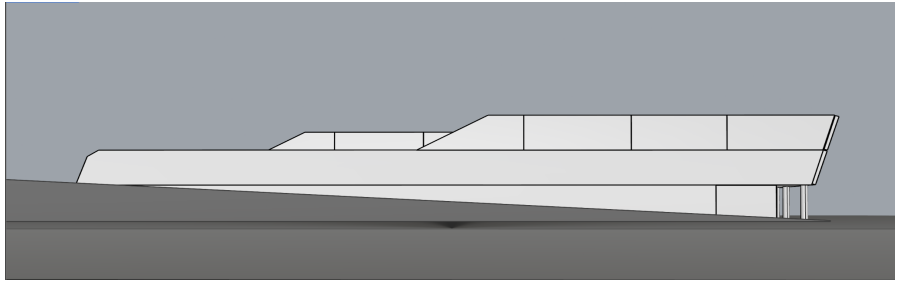
Building Massing:

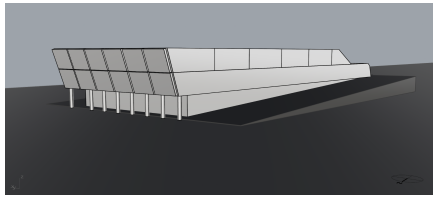


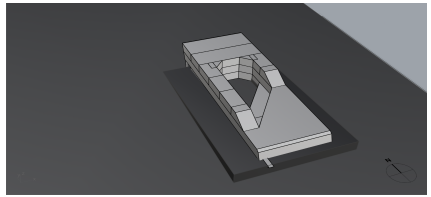




- The two massing models seen here were produced in Rhino 8, one consisting of a two-story, high-ceiling box, and the other a three-story, high ceiling modified rectangle, each of which would contain daylight-exposed internal green space.
- Each massing attempts to address a different subject of focus given in the design philosophy.
    - The initial massing is a two-story hollow box with an approach of earth-sheltered construction. The intent is to try to use the earth wall(s) as a channel for West/Northwest offshore wind around & under the building to reduce cooling/heating energy consumption

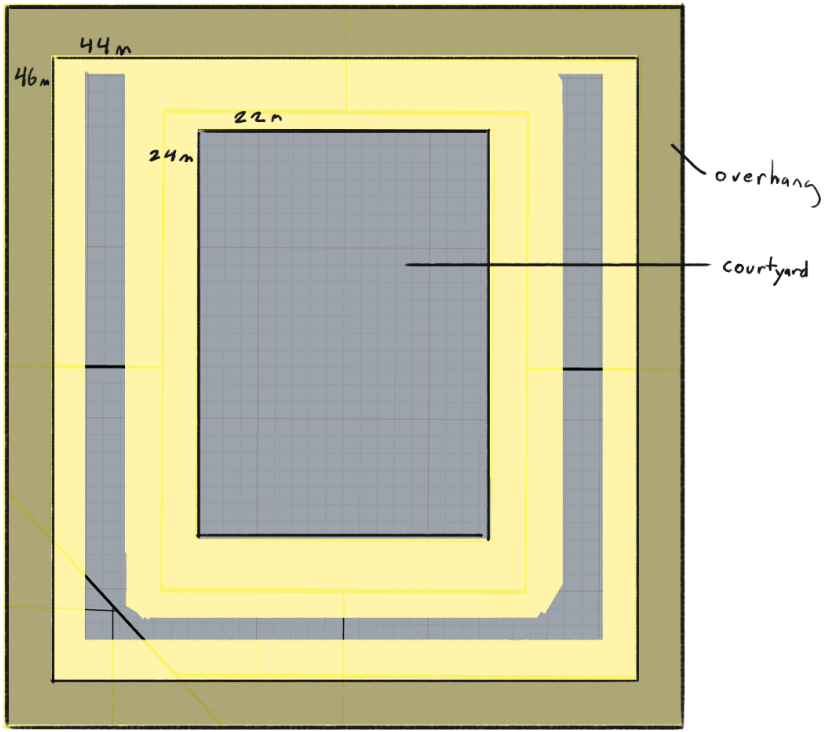






    - The second design is a three-story hollow rectangle exploring a taller massing, with a focus on maximizing exposure for solar gains throughout the year.
- The previous site analysis provided insight as to how the massing could be structured to avoid undesirable cast show from the peripheral structure & increase solar exposure for PV/daylighting

Daylight Availability:



- The Daylighting rules of thumb were applied to find if the massing would support enough natural light for activity:
- Two-Story Hollow Box:
    - The perimeter around the box 200m^2
    - The perimeter inside the box 92m^2
    - 2.1 x 2.5 = 5.25m
    - The daylight availability in total: 1533m^2/1628m^2
    - As a percentage, the daylit area on the first floor is 94%
- Ample bandwidth for moderating the amount of daylight if necessary.