Museum of Environmental Science and Energy

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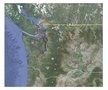
A new waterfront for the city of subdued excitement.



Bellingham, WA is a small progressive city in the northwest corner of Washington State. The city rests beside the water of the puget sound and is home to Western Washington University. Bellingham's population is 80,000 people, and is slowly growing higher with its vibrant culture but hard to be called "the city of subdued excitement" and it is about to experience a major change. Since the 1800's the city's waterfront has been cut off from the water by a large industrial site formerly owned by Georgia-Pacific. This site of about 110 acres in size has been a contaminated site, with a pulp mill and chemical plant which has resulted in an area of land and water riddled with pollution. The plant is now closed and most of the buildings have been removed, leaving the site a wasteland. Plans for the site have been and continued for Bellingham to turn its back once again its lost waters. The city of Bellingham in cooperation with the port of Bellingham has drafted a master plan for the area, in the hopes of replacing an industrial blight with a with a new mixed use waterfront development.

The curved side of the waterfront area.

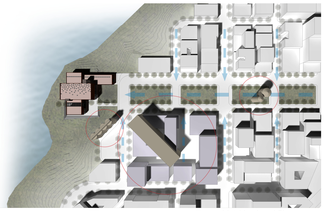
My proposal for this new development is the Museum of Environment science and energy (MESE). It is a conduit between the past and the future. Both a research and science museum, it is a response to the history of the site as well as a testament to the future of environmental practices.

MESE is a building that is of the earth and for the earth. A building that gives reverence to nature while venerating science. Mostly the building is about learning. And since learning is both an internal and external process, MESE will be a place for both internal and external experiences. The exhibit hall is the heart of the building and its focus is both on the objects and exhibits within the building as well as the functioning processes that happen adjacent to it (research labs, brownfield, and reservoir pond, urban adjacencies, etc.)

Large Chip bins adjacent to MESE will be preserved.

Two chip-filled digester tanks will remain as monuments within the park blocks.

Downtown Bellingham Waterfront Master Plan 1" = 200'



Neighborhood Plan 1" = 100'

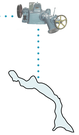
Existing Structures

WWU Extension

New Waterfront Development

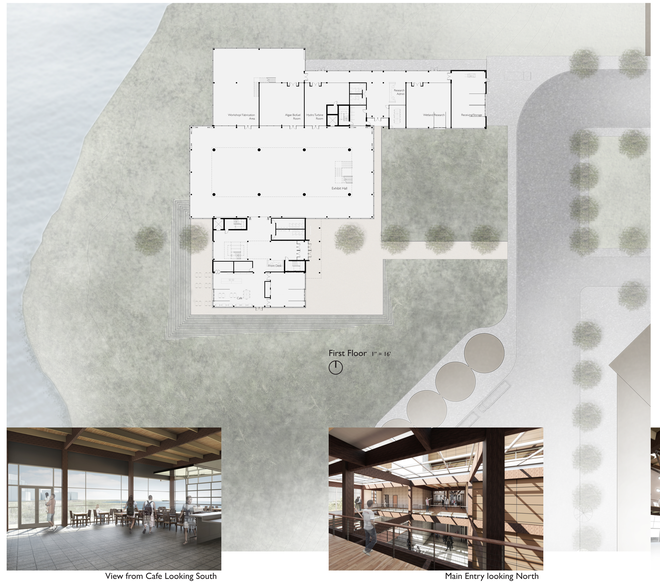
Power Generator

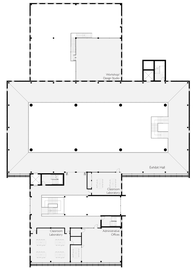
One of the remnants from the industrial emphasis is a large water pipe connected to nearby Lake Whatcom. This pipe can supply up to 70 million gallons a day of water with a head height of 300 feet. This site offers an opportunity MESE will incorporate a turgo type turbine within one of the pipes to provide power to the grown. This turbine will harness the potential hydro power from the water. The turbine will also will produce around one megawatt of electrical generation. This will be enough to provide electricity to around 700 homes.



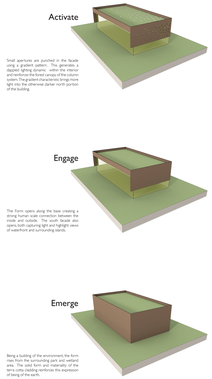
Stormwater Management

One of the functions of MESE will be to act as a filter for stormwater runoff for the area, while providing a research facility that can demonstrate to the public the opportunity MESE will incorporate a turgo type turbine within one of the pipes to provide power to the grown. This turbine will harness the potential hydro power from the water. The turbine will also will produce around one megawatt of electrical generation. This will be enough to provide electricity to around 700 homes.





Second Floor 1" = 16'



Small apertures are punched in the facade using a gradient pattern. This generates a dynamic interior space that is both intimate and reflective the forest canopy of the column system. The gabled characteristic brings more light into the interior, remove darker north portion of the building.

The Form opens along the base creating a strong human scale connection between the inside and outside. The south facade also provides more glare light and highlight views of waterfront and surrounding island.

Being a building of the environment, the form rises from the surrounding park and wetland. The form is clad in a rain screen system of terra cotta cladding reinforcing the experience of being of the earth.

View of Exhibit Hall Facing West

View from Cafe Looking South

Main Entry looking North

Exhibit Hall

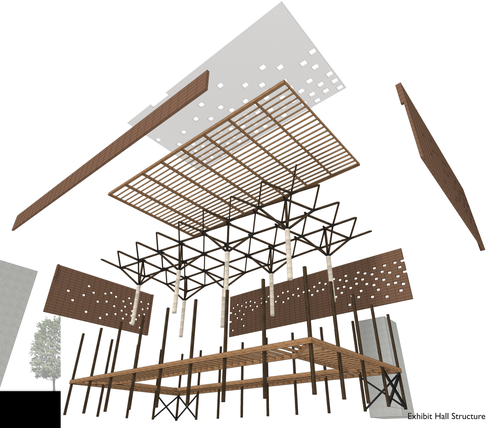


Exhibit Hall Structure

Green Roof

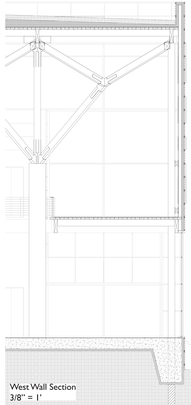
Heavy Timer Columns

Terra Cotta Panels

XPS Rigid Insulation

Steel Stud Curtain Wall

Rough Finish Concrete Flooring

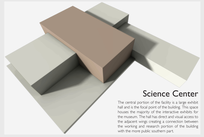


West Wall Section
3/8" = 1'

A mix of uses for the waterfront

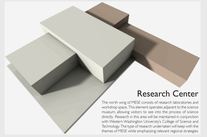
Community Center

The south wing is the most public part of the building and contains a café, event hall, classroom laboratories, and the exhibit hall. The exhibit hall is open to the public. These elements are designed to serve the local community and provide a dynamic and place for learning and interaction. Public restrooms, storage and admin offices are also located in this wing.



Science Center

The central services of the facility is a large exhibit hall and is the focal point of the building. The space is open to the public and is the most public space in the museum. The hall has direct and visual access to the adjacent wings creating a connection between the public and the functioning parts of the building with the more public southern part.



Research Center

The north wing of MESE consists of research laboratories and workshop space. This element operates adjacent to the science and exhibit hall but is not open to the public and is not visible directly. Research in this area will be maintained in conjunction with Western Washington University's College of Science and Technology. Research will be conducted in accordance with the themes of MESE while emphasizing relevant regional strategies.

Wetlands research

The main goal of the wetlands research facility on the north side of MESE will be to manage the stormwater runoff before entering the already polluted waters of Bellingham Bay. Our site will act as the last filter before the water in Bellingham Bay can be used for the first time in large quantity. Bellingham's new waterfront will be more of a park-like monoculture, to creating a diverse and natural planting scheme. Although the wetlands will be in the same area as the Port of Bellingham's LEED certified, but not specifically constructed wetlands, the goal is to have this feature continue on through the park to the water.

Within the retention pond, testing will be done with floating wetlands which not only clean the water of harmful contaminants but also provide a habitat for wildlife and biofuel. The area of the building focusing on this function will be located immediately adjacent to the pond for ease of access. Research and development of floating wetlands will be done at a very small scale for testing and research purposes only.

Algae Biofuel

MESE will contain an on site algae farm to use fresh water. The algae will be grown using photobioreactors, the cells then will be harvested and processed into biofuel. Some of the biofuel will be used on site in a biomass boiler. Remaining of the carbon output can be drawn back into the system to help grow more algae. These processes also produce co-products that can be utilized for other markets and revenue. Co-products from the algae harvesting process can be used for landscaping, fishing and research for these processes will happen adjacent and within the atrium, with the algae bioreactors creating a colorful texture adjacent to the exhibit space.

Among the fastest growing plant species in the world, certain strains of algae grow so rapidly that they can double in size every day. Certain strains of algae when cultivated in a lab, can be induced to produce large amounts of lipids (oils). These oils have chemical compositions similar to petroleum molecules and can be processed into biofuels. Algae oil can easily transform these algae oils into "Third Generation" biofuels that mimic gasoline, diesel and aviation fuel.

Hydro Power

Aside from using the surrounding water energy, also for generating electricity MESE will be using water energy. The two new micro hydro power systems. The turbine will be located in the reservoir pond and other exhibit space to be located along the wetlands and water feature. The type of turbine used will be a Turgo turbine, which is what is commonly referred to as an impulse turbine. Impulse turbines are for smaller systems and use a high pressure water stream to spin the blades. This is the best method of generating electricity at a smaller scale. Because of the low, flow high head nature of the water supply a variety of turbine and impulse turbine systems can be tested within the facility.