

PREREQUISITE ONE – RESPONSIBLE SITE SELECTION

This project is proposed for a site in downtown Seattle at the corner of Denny Way and Stewart Street. The site is previously developed and is currently occupied by a large parking lot and an unoccupied (leasable) three-story building. The project lies just north of the downtown zoning category with the tallest height limits. Moving one block to the north to a zone with a 125-foot height limit was critical for sun access and for access to the infrastructure beneath Denny Way (see Prerequisite Four). This site is also less developed than potential sites on the south side of Denny. Furthermore, in order to produce the necessary power, the Tower would require a height exemption in either zone. Finally, the site is not located within 50-feet of any wetlands nor is it on any sensitive ecological habitat, prime farmland or 100-year flood plains.

PREREQUISITE TWO – LIMITS TO GROWTH

The project is located on a site that has been previously developed as noted above.

PREREQUISITE THREE – HABITAT EXCHANGE

This project provides habitat exchange right on site. Half of the site is devoted to the footprint of the project, and the other half is devoted to the rehabilitation of Seattle's native forests. By leaving 150-feet of airspace above the forested half of the site, the design ensures that plants have access to sun and rain. Furthermore, the project would drastically increase the amount of pervious area on what was formerly a parking lot.

PREREQUISITE FOUR – NET ZERO ENERGY

This project focuses on energy production and is designed to be a net producer of energy. The Tower is specifically intended to replace the need for a new substation supplying the enormous development about to take place in nearby South Lake Union.

First, the project challenges utilities to make use of the stormwater flowing down from the many hills in Seattle by using "stormwater hydroelectric" as a power source. Capitol Hill rises roughly 300 feet above the project site and stormwater from acres of surface streets and building rooftops flows right by and below the site. The project proposes using this stormwater flow to create energy beneath the easternmost portion of the building. In addition, the building would collect stormwater from thousands of square feet of roof area and from the area of thousands of horizontal photovoltaic panels on its south façade (which double as shading devices on the occupied floors of the building). This building stormwater would also flow through hydroelectric turbines before being stored in a cistern beneath Denny Way. Denny Way slopes from about 20-feet above grade to zero-feet above grade as it runs parallel to the building's south façade. The project proposes hollowing out the existing concrete shell holding up Denny Way for use as a cistern. Second, when not raining, photovoltaics on the south, east, and west façades would collect sunlight throughout the day and make use of Seattle's long, low sun angles (especially during the summer, when rain gives way to sun as the dominant power source). Finally, the Tower is designed to optimize power created from wind by creating spaces between four curving walls that open up to the north and south and narrow at their centerpoints. This would create a funnel effect that increases the pressure and therefore the speed of the wind moving through the upper portions of the building. The height of the building would also act to create significant stack effect that would drive separate, horizontally mounted turbines at the top of each interior lightwell. This stack effect would also be maximized by the increased speed of the air moving over the lightwells.

In addition to the production of energy, the building is designed to minimize energy use in the first place. Daylighting is optimized by ensuring that no regularly occupied space in the building is further than 15-feet from a window. The thermal mass of the thick curving concrete walls would provide thermal lag and limit heat gain from west and east sunlight. Stored building stormwater would also serve as a heat exchange for the building's water source heat pump, increasing the efficiency of heating and cooling (similar to a ground source heat pump).

PREREQUISITE FIVE -- MATERIALS RED LIST

The project would not contain substances on the Materials Red List.

PREREQUISITE SIX – CONSTRUCTION CARBON FOOTPRINT

This prerequisite is addressed by the very nature of the project. By being a net producer of energy, the building would essentially be its own carbon offset program because it would drastically reduce the amount of hydrocarbons required to provide power to South Lake Union, thereby offsetting the carbon cost of its construction in a matter of years.¹ Furthermore, due to its status as a producer of renewable energy, it is conceivable that the project would even be able to sell long-term carbon offsets as a means of funding for its construction.

¹ Note that even if Seattle's power largely comes from distant hydroelectric sources, carbon is released every time we build a dam or lose a huge percentage of that power to transmission over large distances (forcing us to build new dams or other power plants), not to mention the harm caused to salmon and other wildlife by large-scale hydroelectric projects.

PREREQUISITE SEVEN – RESPONSIBLE INDUSTRY

All wood used in the project would be FSC certified.

PREREQUISITE EIGHT – APPROPRIATE MATERIALS/SERVICES RADIUS

All materials and services used on the project would follow the guidelines set by the Living Building Challenge User's Guide.

PREREQUISITE NINE – LEADERSHIP IN CONSTRUCTION WASTE

The proposed Tower would follow the guidelines set by the Living Building Challenge User's Guide with regard to Construction Waste Recycling.

PREREQUISITE TEN – NET ZERO WATER²

Similar to Prerequisite Four, the proposed Tower would go beyond net zero water use and be a repository for water that could be used in nearby buildings as well as in the Tower itself. During the dry season the sheer quantity of stored building stormwater (roughly 800,000 gallons stored beneath Denny Way) would allow the building to get through summers without relying on city water, and depending on actual water use this cistern could even offer some water to neighboring buildings. During the rainy season the constant refilling of this cistern would give the Tower as well as other buildings nearby an alternative to city water, reducing the demand on distant rivers and preparing Seattle for the inevitable disappearance of the glaciers that feed its reservoirs.³ By investing in stormwater hydroelectric power, the project would accomplish two goals with one concept. The Tower would generate power and store water for other buildings within the same components of the building, the two hydroelectric cisterns.

PREREQUISITE ELEVEN – SUSTAINABLE WATER DISCHARGE

Building stormwater would be collected and reused as noted in Prerequisite Ten. Wastewater would be treated on site with a "living machine" that fills a portion of the site's forested corner. The project would also go beyond Living Building Challenge requirements by working at the scale of the City and slowing stormwater discharge to Lake Union with its 6,000,000-gallon cistern (beneath the easternmost portion of the building).

PREREQUISITE TWELVE – A CIVILIZED WORK ENVIRONMENT

Every occupiable space in the building is designed to have access to fresh air and sunlight.

PREREQUISITE THIRTEEN – HEALTHY AIR/SOURCE CONTROL

The proposed project would follow the guidelines for this prerequisite set by the Living Building Challenge User's Guide.

PREREQUISITE FOURTEEN – HEALTHY AIR – VENTILATION

The building would comply with California Title 24 requirements.

PREREQUISITE FIFTEEN – BEAUTY AND SPIRIT

The proposed tower would be the tallest building in Seattle and would be a constant reminder of the power that moves all around us in the form of sun, wind, and rain. The rehabilitation of native forest on half of the site would provide an amazing oasis in the middle of the city. Inhabitants with a range of incomes would have access to perhaps the best views in any urban center on the west coast, if not the United States or even the world. Finally, the building would recreate the paradigm of the lighthouse, but set in the center of the city; that is, utilities recognizing a public need would join with the caretakers of the building—the inhabitants themselves—to help save the energy-hungry buildings seeking safe harbor at the south end of Lake Union.

PREREQUISITE SIXTEEN – INSPIRATION AND EDUCATION

Throughout the year, shoppers in the lower portion of the building would walk by slowly spinning art installations geared directly to the turbines right under their feet. Everyone in the building would receive environmental training from building managers prior to living or working there in order to encourage every tenant to be an environmental ambassador for the building. And on one sunny summer day every year the building would be opened to the public for educational access to building systems. The Capitol Hill cistern would be emptied so that people could walk right up to a stormwater turbine in the cavernous space beneath the building. Residential elevators with access to the upper roof decks would be open to the public. And building tenants would use their environmental training to educate their friends, family, and fellow city-dwellers.

² Order-of-Magnitude Cistern Calculations: 1 cu. ft. = 7.48 gallons; Building Stormwater (Denny Way) = $(\frac{1}{2} \times (250' \text{ L} \times 20' \text{ H})) \times 50' \text{ W} = 125,000 \text{ cu. ft.} = 935,000 \text{ gallons}$. Subtract 135,000 gallons for the volume of turbines to get approximately 800,000 gallons. Capitol Hill Stormwater (below the easternmost portion of building) = $\sim 275' \text{ L} \times \sim 70' \text{ W} \times 60' \text{ D} = 1,155,000 \text{ cu. ft.} = 8,639,400 \text{ gallons}$. Subtract 2,639,400 gallons for the volume of turbines to get roughly 6,000,000 gallons.

³ Note, stormwater from Capitol Hill surface runoff is likely to be too difficult to treat to potable standards, so only building runoff is considered here. It is possible, however, that the Capitol Hill runoff could be used for irrigation needs at nearby buildings.