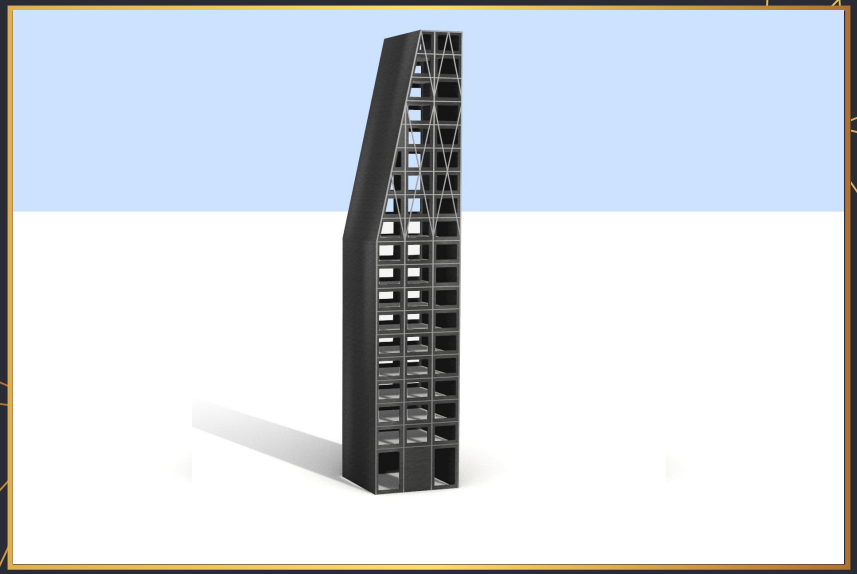
Cascadia Tower



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Geotechnical Analysis

The regional geology of Seattle is defined by its location near three bedrock structures, the Seattle Uplift, the Seattle Fault, the Seattle Basin, and two mountain ranges, the Cascade Range and Olympic Mountains. Being located in this basin, energy from an earthquake is easily trapped, and the harmful effects of the earthquake on the built environment can potentially be amplified. Local faults near Seattle exist within the Seattle Fault Zone. One such local fault, the Cascadia Subduction Zone (CSZ), is capable of producing megathrust earthquakes. Our building must be able to withstand large earthquakes. With proper ground improvement techniques such as compaction grouting and *in situ* soil mixing, and liquefaction mitigation efforts, the seismic soil profile indicates site class E. Our structural design will account for the site's anticipated ground shaking effects.

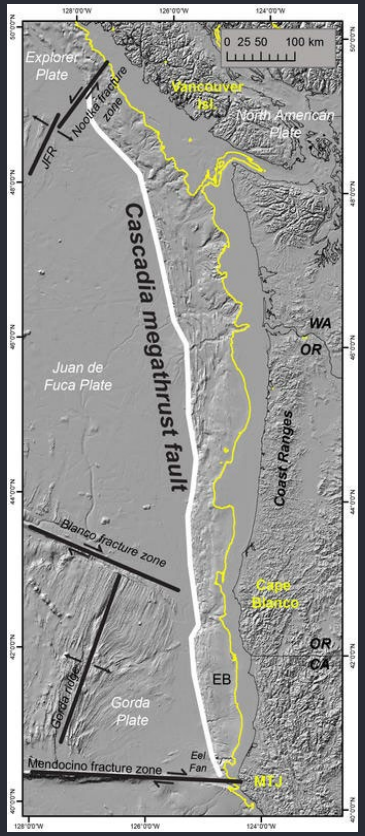


Figure 1. CSZ, Juan de Fuca and North American Plate *Cascadia Subduction Zone Marine Geohazards*

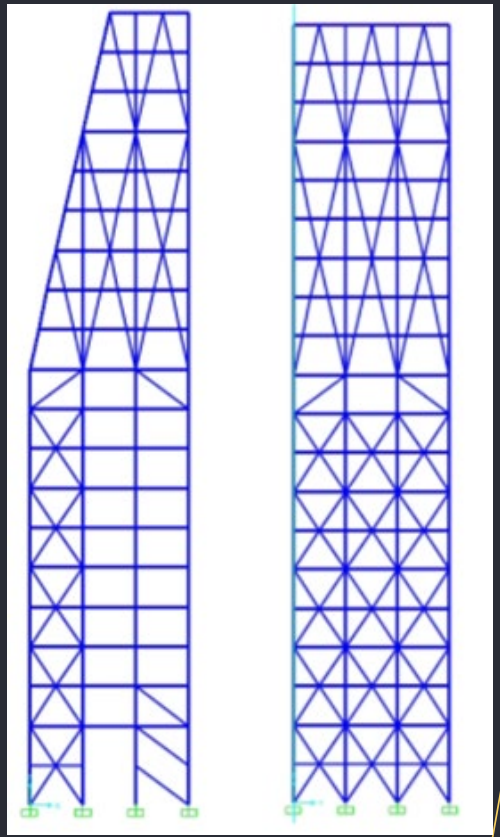
Architectural Design

Combining functionality and aesthetic, the hospital is uniquely design to capture the essence and spirit of Seattle. The tapering blends seamlessly into the skyline, while the glass facade allows for ample sunlight to seep in, providing insulation and reducing electricity and mechanical costs. The building also has a rainwater collection system, resulting in carbon footprint reduction.

Our architecture design aimed to accommodate the growing sustainability movement in Seattle, since the building fits perfectly into Seattle's Climate Action plan.

Structural Design

The structural addition to the hospital dramatically tapers west due to concerns with large displacement from adjacent buildings. To ensure the deadweight of the addition was transferred to the lower part of the building with adequate lateral support, the addition is covered in X-Shaped external diagonal bracing. The X-bracing provides stability from abnormal movements the dissymmetry of the taper may cause. Additionally, the X-bracing is able to withstand all four of the earthquake tests in both lateral directions. After analyzing the structural design, the retrofit component added to the structure was Fluid Viscous Dampers due to its ability to lower energy and building displacement. FVDs were added to the floor with the highest drift ratio (Floor 11) and to the bottom of the structure where the columns experienced the highest stress.



Addition Layout

The hospital's new addition was specifically designed to combat the spread of COVID-19. These design aspects include U-shaped hallways that ensure one way traffic, increased air flow, and a waiting area at the entrance of each floor to limit exposure with patients and hospital staff. Additionally, offices and nurses stations were strategically placed in the center for easy access to all patients.