

Project

Engineering team delivers new elementary school with Western Hemisphere’s first vertical tsunami evacuation structure

55 feet above sea level

and 28 feet above grade, to accommodate a tsunami that can reach an elevation of 32 feet above sea level.

1,000+ people

can fit on evacuation tower roof (nearly half the town’s population)

1st tsunami safe haven

constructed in the Western Hemisphere

Summary

- An elementary school needed a tsunami tower where students could take refuge in a major Cascadia Subduction Zone earthquake and tsunami.
- We completed detailed geotechnical analyses to design a building that would stay as steady as possible.
- Our work provided a safer space for 300+ students to weather a natural disaster.

Client challenge

If a major Cascadia Subduction Zone (CSZ) earthquake happened during a school day, more than 300 elementary school students in Westport, Wash., would sit directly in the path of the resulting tsunami (a nightmare scenario familiar to communities along the Pacific Northwest coast).

Westport's elementary school needed to be replaced, and the Ocosta School District set out to safeguard its students with a new building, one that would include the Western Hemisphere's first vertical tsunami evacuation structure.

The district turned to a team that included Haley & Aldrich to design the building's foundation and evaluate the hazards posed by an earthquake and tsunami. We brought expertise in the potential impacts of a CSZ disaster and other large-scale earthquakes around the globe.

Our approach

The new school's gym — the roof of which would serve as the tsunami evacuation area — needed a foundation that could withstand both the severe shaking caused by the CSZ earthquake and the subsequent tsunami, which could move at up to 30 miles per hour and carry devastating debris.

To test our proposed pile foundation system, we completed detailed geotechnical analyses of the effects of a CSZ earthquake, including extreme ground shaking, soil liquefaction, lateral spreading, and flow failures. The potential for tsunami-induced scour further complicated these analyses; it could cause more than 12 feet of soil loss adjacent to the building. Ultimately, to keep the gym as steady as possible, we determined it should be supported on groups of auger cast piles 24 inches in diameter and nearly 50 feet long.

Since the completion of this project, Haley & Aldrich has worked on the planning or design of many more tsunami refuge projects in the Pacific Northwest.

Value delivered

- Designed a foundation that could withstand both the severe shaking caused by the CSZ earthquake and the subsequent tsunami
- Provided a safer space for elementary school students and community members weather a natural disaster
- Since the completion of this project, planned, designed, and/or constructed nearly a dozen tsunami refuge projects in the Pacific Northwest

For more information, contact:



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