



Preparing Schools for Earthquakes Schools and the Tsunami Hazard

Photo: USGS



Above: Signs marking the tsunami hazard zone and evacuation routes are now a familiar sight along the coast of the Pacific Northwest.

In this fact sheet:

- Why some coastal schools face a double hazard
- Options for protecting students from a future tsunami
- How some school districts and local communities have met the challenge

Know the steps to take when a quake occurs on the coast:

1. Drop, cover, and hold on.
2. Move immediately to high ground or inland: Don't wait for an official warning.
3. Don't return until you hear the official all-clear.

School districts should plan for earthquakes and tsunamis and conduct regular drills. Make sure everyone knows the plan and where to meet outside of the hazard zone so family members won't endanger themselves trying to find their students.

The Challenge for Schools on the Northwest Coast

Schools near the Pacific Ocean face two big hazards due to their proximity to the Cascadia subduction zone, the roughly 700-mile long fault zone extending from northern California to British Columbia. Earthquakes here can be as large as magnitude 9.0 and will trigger a tsunami. All schools must be prepared for intense shaking during such a quake; schools in tsunami inundation zones must also be ready to evacuate immediately to higher ground.

Moving to High Ground

Many communities built schools in the tsunami hazard zone before the danger was known. Fortunately, ongoing research and lessons from tsunami events in Japan and elsewhere have yielded tools and resources that can help school districts assess their risks and prepare effectively. For instance, tsunami modeling and inundation maps help reveal safe areas for new buildings, and evacuation maps show the way to high ground.

Such research helped Seaside in Oregon see that relocating three schools is the safest option: The old buildings are prone to quake damage and are also located in the tsunami zone. (A tsunami from Cascadia could arrive here in 20 minutes or less, giving students little time to escape). Moving the schools took years of perseverance: One challenge—finding a suitable building site—was overcome when Weyerhaeuser donated 80 acres for the new campus. Another hurdle was financing the project. It was only after students began fundraising that the district finally achieved its goal: In November 2016, voters passed a \$99.7-million bond measure to build the new school campus on high ground.



Lincoln County School District chose to build a new high school in Waldport, outside of the tsunami hazard zone. —Learn more on pg. 2.

Photo: Cohen & Park Portrait Studio/Lincoln County SD

Did You Know?

Tsunamis from distant earthquakes can take hours to arrive, but a tsunami from the Cascadia subduction zone will reach shore quickly: In some areas, people may have as little as 15–20 minutes to escape the hazard zone. This is why rebuilding schools on high ground—or constructing vertical refuges if no high ground exists—is critical for vulnerable communities.

Tips for Success

The old Waldport High School in Oregon was in the tsunami hazard zone until residents of Lincoln City, Newport, Toledo, and Waldport passed a \$63-million bond measure in 2011, part of which was used to construct a new school on a safe site. Over 600 students are now at the shared K–12 campus above the hazard zone.

In addition to concern for students' safety, a number of factors encouraged voters to pass the bond, including assurances that the funds would be spent to hire local contractors whenever possible, thus stimulating the local economy. The timing also helped: the new bond replaced a bond that was coming to an end, so residents saw no overall increase in their taxes.

Going Vertical

Sometimes the nearest high ground is just too far away. Ocosta Elementary School in Washington is located on a peninsula with the Pacific on one side and a bay on the other. Most of the land is inside the tsunami hazard zone, so the district had no sites on which to build and no high ground near enough for a safe evacuation.

The solution was the nation's first vertical tsunami refuge. When the elementary school was due to be rebuilt, local voters passed a bond measure to pay for a new building that includes a gym designed to withstand the impacts of a tsunami. This concrete and steel building is tall enough to exceed the height of tsunami waves and is securely anchored to the ground by deep pilings. The large roof offers safe refuge not only to the district's 700 students and staff, but to the public also.



Photo: TCF Architecture and Degenkolt Engineers

The gym at Ocosta Elementary School was built to be a tsunami evacuation refuge. In the event of a tsunami, students and staff from the district's schools, plus nearby community members, can quickly climb wide staircases to reach the roof, which is safely above the highest predicted tsunami waves and could fit as many as 2,000 people. The total cost of the new school was \$16 million, which includes about \$2 million for the tsunami-resistant design features.

Featured Resources

Oregon Tsunami Clearinghouse: www.oregongeology.org/tsuclearinghouse/

Washington tsunami info: www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/tsunamis

School tsunami safety videos: www.mil.wa.gov/emergency-management-division/preparedness/school-preparedness

NOAA & National Weather Service—tsunami safety and resources: www.weather.gov/safety/tsunami

National Clearinghouse for Educational Facilities: www.ncef.org/content/earthquakes-and-schools

Example of an earthquake-preparedness training video: <https://vimeo.com/167810169>

Readiness and Emergency Management for Schools: <https://rems.ed.gov/>

FEMA's hazard mitigation assistance grants: www.fema.gov/hazard-mitigation-assistance